



# Case Study

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## Carolinas Medical Center: Demonstrating High Quality in the Public Sector

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### Vital Signs

*Location:* Charlotte, N.C.

*Type:* Public teaching hospital

*Beds:* 130 beds

*Distinction:* Carolinas Medical Center–University, a public hospital, ranks in the top 3 percent of U.S. hospitals on a composite of 23 process-of-care quality measures. More than 2,000 public and private hospitals were eligible for the analysis. Other hospitals in the Carolinas HealthCare System, Carolinas Medical Center–Mercy/Carolinas Medical Center–Pineville, and Carolinas Medical Center (the flagship hospital), ranked in the top 10 percent in the same time period. In the year following the data analysis for this study, a new hospital joined the system, Carolinas Medical Center–NorthEast, whose scores also place it in the top 10 percent of hospitals nationally.

*Timeframe:* April 2007 through March 2008. See [Appendix](#) for full methodology.



### SUMMARY

Carolinas Medical Center was established by the Charlotte-Mecklenberg County Public Authority in 1939 to meet the health care needs of Mecklenberg County residents, and opened its first hospital in 1940. Keeping pace with population growth, multiple facilities now continue the original mission to “care for all who come.” High scores on process-of-care, or “core,” measures distinguish the Carolinas Medical Center network hospitals as a group, and Carolinas Medical Center–University as the top performer among them. The core measures, developed by the Hospital Quality Alliance (HQA) and reported by hospitals to the Centers for Medicare and Medicaid Services (CMS), relate to achievement of recommended treatment in four clinical areas: heart attack, heart failure, pneumonia, and surgical care. Four Carolinas Medical Center hospitals scored in the top 10 percent of all hospitals nationally, including one in the top 3 percent, for

the period April 2007 to March 2008. Fewer than 10 public hospitals scored in the top tenth percentile during that period. This case study looks at the Carolinas Medical Center network of hospitals and one of them, Carolinas Medical Center–University, in particular.

Public hospitals may face greater challenges in delivering high-quality care than private hospitals since they often treat more complex patients, face budget shortfalls, and have older infrastructures.<sup>1</sup> However, Carolinas Medical Center’s strategies for improving quality and safety are similar to those often used by private hospitals. The network relies on multidisciplinary teams who are accountable to leadership for meeting goals; reviews and publicizes performance indicators across hospitals in its network; and redesigns care processes so that standards can be achieved as a matter of routine. Like many U.S. hospitals, Carolinas Medical Center hospitals are still in the process of implementing electronic medical records, which should make many aspects of quality improvement easier.<sup>2</sup>

“The challenges and complexity that CMC faces are a regular part of the health care environment,” according to Roger Ray, M.D., executive vice president and chief medical officer for the parent organization, Carolinas HealthCare System. “The system leadership does not accept that public hospitals have reason to lag behind private hospitals in delivering quality care.” Still, few safety net hospitals are in the top ten percent of hospitals in the country on core measures. For further information about the public hospital selection process and cross-cutting lessons about their improvement efforts, please see our [introduction](#) to the public hospital case study series.

## ORGANIZATION

The Charlotte-Mecklenburg Hospital Authority, now called Carolinas HealthCare System (CHS), was established in 1943 shortly after the Authority opened its first hospital in 1940. CHS has grown into the largest health care system in the Carolinas, and the third-largest public system in the country. CHS owns, leases, or manages [32 hospitals](#) in North and South Carolina and employs over 1,400 physicians practicing in more than 475 locations. CHS also operates rehabilitation hospitals, nursing homes, ambulatory surgery centers, home health agencies, radiation therapy centers, and physical therapy facilities. In total, CHS operates over 6,000 licensed beds and employs more than 44,000 workers.

CHS’s flagship facility is [Carolinas Medical Center \(CMC\)](#) in Charlotte, an 874-bed hospital with a Level I trauma center, a research institute, and a large number of specialty treatment units including heart, cancer, organ transplant, and behavioral health. Other CHS hospitals in Mecklenburg County include: CMC–University, CMC–NorthEast, and CMC–Mercy/CMC–Pineville. The latter two entities have inpatient sites, but appear as one entity on the CMS Web site, Hospital Compare. CMC trains 240 physicians in 18 specialties annually, and is one of North Carolina’s five teaching institutions.

CMC hospitals function much like other non-profit institutions; they have a strong commitment to contributing to the health of the community and providing charity care to people with inadequate or no health insurance. Compared with national averages, CMC serves a larger proportion of self-pay (uninsured) patients and a smaller proportion of Medicare patients (Exhibit 1). They receive funding from Mecklenburg County to defray the cost of treating the uninsured. In 2007, CHS received \$16.7 million. Community benefits for the 10 CHS hospitals in Charlotte are calculated by CHS as exceeding \$511 million, and enterprise wide across all North and South

<sup>1</sup> For this case study series, public hospitals were defined as those that are government owned and/or members of the National Association of Public Hospitals. It was not possible to compare hospitals by their payer mix, since hospitals may define payer categories in different ways.

<sup>2</sup> A. K. Jha, C. M. DesRoches, E. G. Campbell et al., “Use of Electronic Health Records in U.S. Hospitals,” *New England Journal of Medicine*, 2009 360(16):1628–38.

## Exhibit 1. Carolinas Medical Center Payer Mix Compared with the National Average

	Carolinas Medical Center (2008)	National Average (2007)
Medicare	31.3%	39.2%
Medicaid	15.4%	14.8%
Commercial/Private	40.5%	36.5%
Self-Pay/Uncompensated care	12.8%	8%
Other government	N/A	2%
Non-patient revenue	N/A	2.2%

Sources: Carolinas Medical Center and American Hospital Association, <http://www.aha.org/aha/research-and-trends/chartbook/ch4.html>.

Carolina hospitals, total \$770 million, or over 18 percent of operating revenue (Exhibit 2).<sup>3</sup>

### System-Level Quality Activities

Individual CMC hospitals have active quality improvement departments as well as task forces addressing high-priority problems. About three years ago, though, CHS' leaders committed to a system-wide approach to quality and safety as part of their plan for growth in the region. They observed that their commitment to mission and financial stability might not be a sufficient basis for long-term competitiveness, and that providing exceptional quality had to become a higher priority.

CHS created quality, safety, and accreditation support teams, each of which follows a unified approach as it works in system hospitals to foster improvements. CHS also hired a vice president for quality to spearhead the improvement work.

### Electronic Medical Records

System leaders realized that electronic medical records would help its hospitals to standardize appropriate care, improve documentation and communication, and monitor quality. CHS was challenged by the

complexity of identifying the best system to support the numerous inpatient and outpatient sites in the Charlotte area and more broadly in the other hospitals outside of Mecklenburg County that CHS manages. A committee was formed to select the best product for the diverse needs of its many types of hospitals, customize it, and develop the implementation strategy. CHS is now two years into the long rollout of the electronic medical record system. Hospital-based personnel at CMC began to use it for clinical documentation in 2007. However, physician order entry and documentation are not yet implemented, complicating some care processes, such as medication reconciliation.

### Quality Assemblies

CHS established annual Quality Assemblies to set priorities and align the quality and safety agendas of the hospitals. The goal of the meetings is to gather input from all levels of staff across the many care settings, ensuring that people directly involved in patient care help frame the agenda. Several hundred attended the first Quality Assembly in August 2008 to discuss, debate, and prioritize the needs and suggestions of personnel from throughout the system and to set improvement goals. Participants agreed upon 13 major goals, which fall into four categories:

- Safety: reducing hospital-acquired conditions (e.g., infections, deep vein thrombosis, wrong-side surgeries, and other rare but preventable

<sup>3</sup> The national average for charity care among nonprofit hospitals is 9 percent, though there may be differences between the methodology used in the national study and that used by CHS. Source for national data is the IRS, as reported by the Kaiser Daily Health Policy Report, February 2009, [www.onlinecardonation.org/charity-news/not-for-profit-hospital.htm](http://www.onlinecardonation.org/charity-news/not-for-profit-hospital.htm), accessed March 2010.

**Exhibit 2. Community Benefit Reported by Carolinas Health System for  
Carolinas Medical Center and the System, 2008 (in millions)**

	Primary Enterprise (10 hospitals in Charlotte, NC, area)***	Carolinas HealthCare System (29 hospitals across North and South Carolina)
Cost of charity care provided to indigent patients	\$104	\$138
Costs of discounts extended to uninsured patients	\$11	\$41
Bad debt costs by patients who do not pay for services	\$62	\$126
Losses incurred by serving Medicare patients*	\$192	\$268
Losses incurred by serving Medicaid patients*	\$57	\$96
Services that meet a strong community need, such as psychiatric care, but do not pay for themselves and would typically be cut based on financial considerations alone	\$11	\$14
Costs of medical education and research;** plus costs of non-billed medical services, and cash and in-kind contributions by CHS to local nonprofits and charities	\$74	\$87
<b>Total value of uncompensated care and other community benefits provided by CHS facilities</b>	<b>\$511 m</b>	<b>\$770 m</b>

\* Medicare and Medicaid programs do not reimburse hospitals in a manner that compensates for the actual cost of treating their beneficiaries. The financing of this unpaid government debt is considered a community benefit.

\*\* Carolinas Medical Center operates [Carolinas College of Health Sciences](#), [Mercy School of Nursing](#), and [Cannon Research Center](#), and trains more than 240 physicians a year. Its physicians and staff also take a leading role in conducting hundreds of clinical studies to test new medicines and treatments in a variety of specialties such as cardiology, neurology, oncology, and pediatrics. The net loss from these programs is considered a community benefit.

\*\*\* Includes CMC hospitals and outpatient facilities in Charlotte-Mecklenburg County.  
Source: Carolinas Health System 2008 Annual Report.

errors) and improving the safety culture so that staff are willing to identify and discuss errors to guard against their recurrence.

- Outcomes: lowering overall mortality rates, providing care in compliance with the core measures, and providing evidence-based diabetes care.
- Service excellence: meeting or exceeding the expectations of patients, employees, and physicians.
- Clinical efficiency: reducing the severity-adjusted length-of-stay, furthering the adoption of evidence-based order sets, and reducing waiting times.

Goals are adjusted yearly, for example, reducing avoidable hospital readmissions was added at the second annual Quality Assembly, in August 2009.

### **Accountability**

Each CMC hospital reports its performance data on various quality indicators, which are aligned with the priorities set at the Quality Assembly, to the health system, and variances and improvement plans are discussed at the system level. Data are also distributed to various management and clinical staff at each hospital, who use them for benchmarking and improvement work. There are no penalties for low performance, but the hospitals are motivated by competitiveness to achieve top scores. Action plans for improvement, described below, are developed by frontline staff and managers at each hospital, and reviewed by senior leaders.

System-wide Quality and Safety Operations Councils comprised of quality leaders in each hospital meet via conference call once a month to discuss quality initiatives. There are currently eight to 10 groups working on various issues prioritized by the Quality Assembly, including the core measures.

Between 2006 and 2009, CHS experienced a decline in inpatient complication and mortality rates relative to expected rates. Though not exclusively related to improvement on core measures, this success has bolstered the hospitals' dedication to improvement.

### **Hospital-Level Quality Activities**

This section focuses on the quality improvement activities undertaken at CMC–University, which received the highest scores on core measures among CHS hospitals.

On most aspects of care, CMC–University does not face particular challenges in complying with the core measures because it is a public hospital. CEO Spencer Lilly, noted that discharge planners have encountered some difficulties connecting uninsured patients to outpatient sites for follow-up care. To address this, the hospital created referral networks, in which primary care practices agreed to see a number of newly discharged patients from CMC–University for follow-up care, regardless of their insurance status. Upon admission, hospital staff ask each patient if they have a primary care provider and make referrals to the community practices for those who need them.

### **Physician Buy-In**

Because of admissions patterns at CMC–University, two groups of physicians—emergency department (ED) doctors and hospitalists—play an especially important role in achieving high scores on core measures. CMC–University had more than 70,000 ED visits last year, and over 80 percent of non-obstetrics admissions originated in the emergency department.<sup>4</sup> This admissions pattern means that the majority of patients are cared for by the physicians who staff the ED and/or the hospitalists who cover the inpatient services. Both groups have been supportive of the core measures standards. Lilly says the hospital might have considered building performance on core measures into physician contracts, but there was no need to do since most physicians quickly learned to adhere to the care standards.

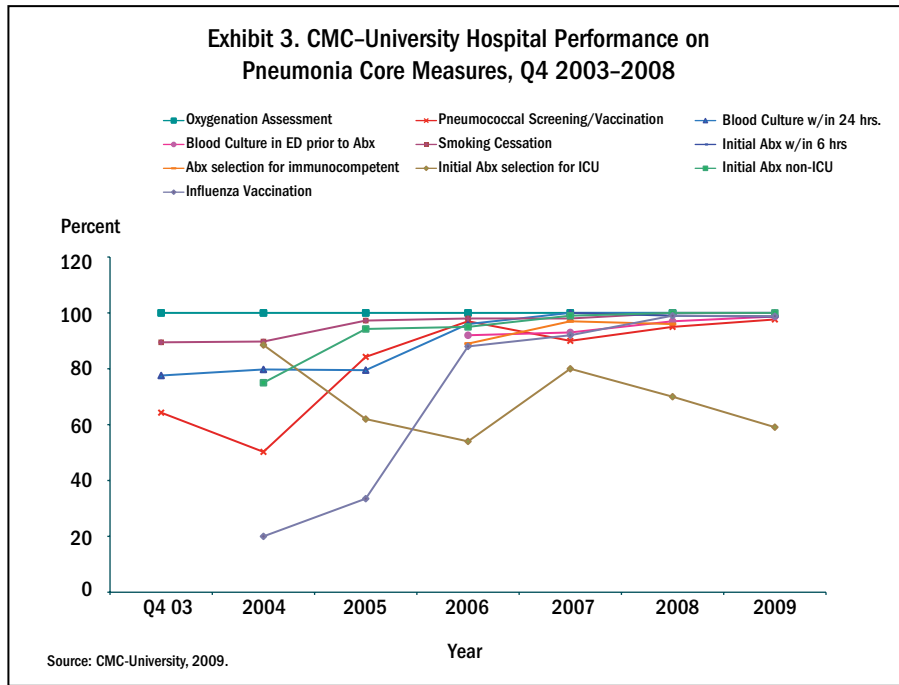
### **Nurses' Role in Quality Improvement**

CMC–University nurses receive training on the core measure care processes and use reminder systems, such as brightly colored sheets in medical charts that prompt them to complete and document each indicator. At the bedside, it is their responsibility to ensure each recommended care process is achieved.

Like other high-performing hospitals, CMC–University has implemented practice changes to support nurses. The hospital uses standing orders for many elements of the core measures, such as administration of antibiotics before and after surgery and aspirin upon arrival for acute myocardial infarction patients. When there is a pattern of non-adherence with a particular measure, nurses look for ways to automate processes to achieve the desired outcomes. For example, nurses discovered that not all heart failure patients were getting smoking cessation counseling in part due to late identification of some of these patients. Their solution was that all patients receive smoking cessation counseling, with non-smokers asked to share the information with a friend or family member who smokes.

Once a month, a multidisciplinary core measure team at CMC–University meets to discuss performance on core measures, and staff nurses take the lead in presenting and discussing results. Other team members include physician champions, pharmacists, clinical case managers, and, sometimes, medical records personnel. The team reviews all care that falls out of compliance with standards. Data and case notes are sent to the relevant nurse and physician leader for review. The team may identify a care process that needs to be redesigned and undertake or assign responsibility for that work. Nurses have to complete performance improvement projects as part of their professional advancement. In addition, individual acts of leadership by nurses—such as checking all preoperative antibiotics to make sure they are ready for the next day's surgery—are recognized.

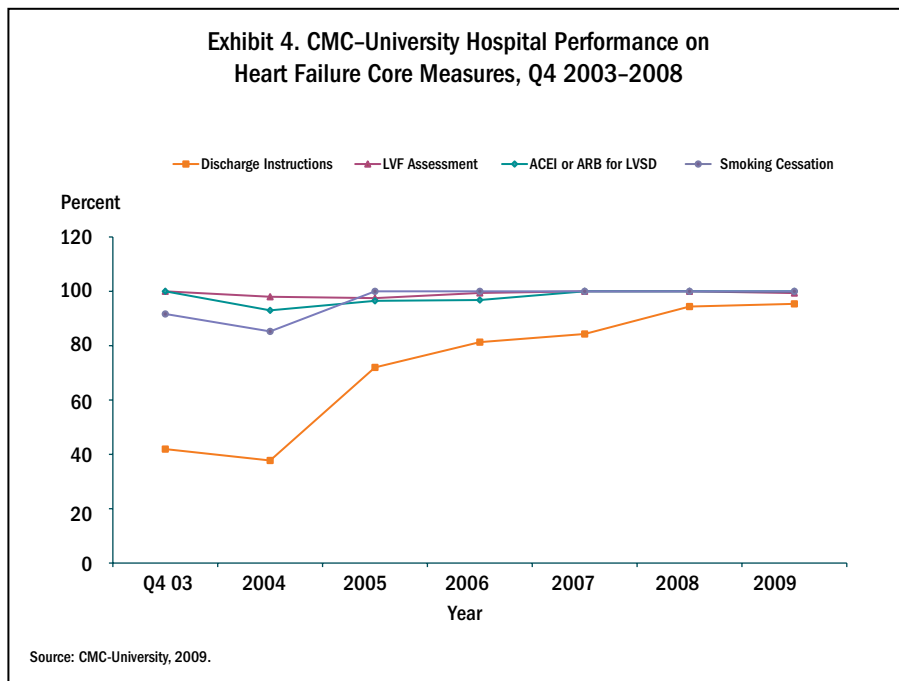
<sup>4</sup> Nationally, approximately 50 percent of non-obstetrics inpatients are admitted through the emergency department, <http://www.cdc.gov/media/pressrel/2008/r080806.htm>.



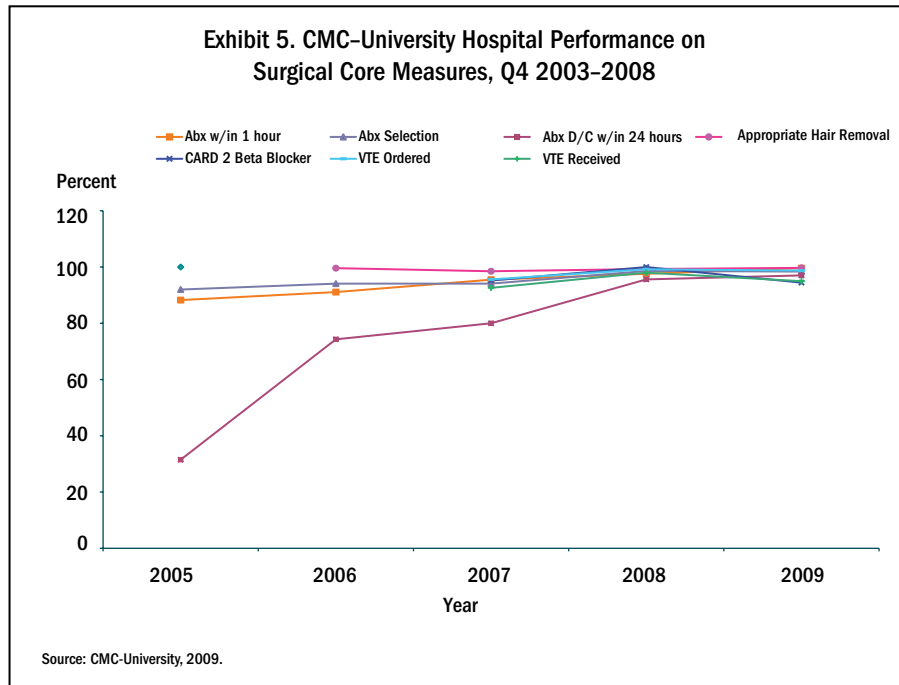
### Improving Vaccination Rates

In 2004, just 20 percent of CMC–University’s pneumonia patients received an influenza vaccine. Although the vaccine was ordered and appeared on the medication administration record, over the course of the stay the order would get pushed to the bottom of the electronic medication record and be overlooked more often than it was administered. Nurses led a team that examined the data, mapped the care process, and

tested several changes. Rather than waiting until discharge to give the immunization, the nurses concluded that it would be more reliable to administer the vaccine earlier in the hospital stay. After reviewing the evidence, the physicians found that it was highly unlikely a patient would have a reaction or negative consequences of the immunization and agreed to a standing order for the vaccine, with an opportunity for the physician to exclude those patients for whom it





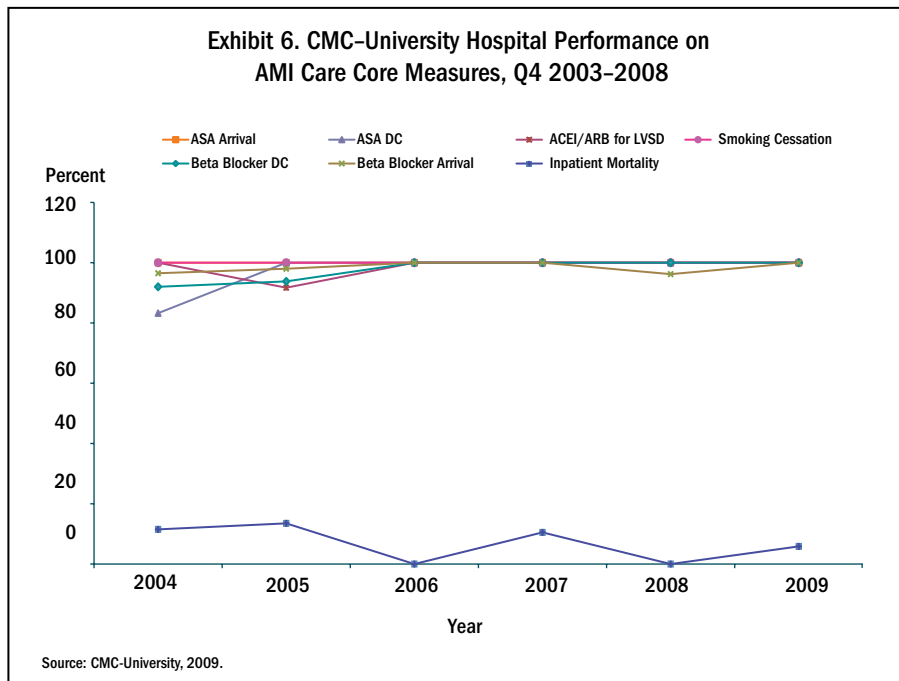


was contraindicated. To further support the change in nursing practice, the medication administration record was programmed to remind staff to deliver the vaccination. These steps raised compliance to 99 percent (Exhibit 3).

**Manual Medication Reconciliation Review**

Through medication reconciliation—part of the recommended discharge process for heart failure

patients—health care providers ensure patients are sent home with the correct prescriptions and understand their medication regimes. Since CMC–University physicians are not yet able to add information or orders to patients’ electronic medical records, medication reconciliation is a manual process. Nurses obtain a list of medications from the patient or a family member, enter the list into the patient’s electronic medical record, and print the list. A physician then reviews and



### Exhibit 7. CMC–University Hospital Scores on Core Measures Compared with State and National Averages

Indicator	National Average	North Carolina Average	CMC Network Average	CMC–University Hospital
<b>Heart Failure<sup>a</sup></b>				
Percent of heart failure patients given discharge instructions	78%	81%	90% of 2,088 patients	92% of 143 patients
Percent of heart failure patients given an evaluation of left ventricular systolic (LVS) function	90%	95%	99% of 2,369 patients	100% of 146 patients
Percent of heart failure patients given ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD)	90%	92%	98% of 947 patients	100% of 57 patients
Percent of heart failure patients given smoking cessation advice/counseling	92%	95%	99% of 537 patients	100% of 36 patients
<b>Pneumonia<sup>a</sup></b>				
Percent of pneumonia patients assessed and given pneumococcal vaccination	86%	91%	97% of 1,085 patients	99% of 69 patients
Percent of pneumonia patients whose initial emergency room blood culture was performed prior to the administration of the first hospital dose of antibiotics	92%	93%	98% of 1,288 patients	99% of 118 patients
Percent of pneumonia patients given smoking cessation advice/counseling	90%	95%	99% of 665 patients	100% of 65 patients
Percent of pneumonia patients given initial antibiotic(s) within 6 hours after arrival	94%	94%	95% of 1,386 patients	99% of 124 patients
Percent of pneumonia patients given the most appropriate initial antibiotic(s)	89%	89%	N/A	91% of 93 patients
Percent of pneumonia patients assessed and given influenza vaccination	85%	90%	96% of 956 patients	97% of 71 patients
<b>Heart Attack</b>				
Percent of heart attack patients given aspirin at arrival	94%	95%	99% of 942 patients	100% of 27 patients
Percent of heart attack patients given aspirin at discharge	93%	94%	99% of 1,798 patients	100% of 12 patients*
Percent of heart attack patients given ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD)	92%	91%	98% of 380 patients	100% of 1 patient*
Percent of heart attack patients given smoking cessation advice/counseling	96%	99%	100% of 723 patients	100% of 3 patients*
Percent of heart attack patients given beta blocker at discharge	94%	95%	99% of 1,741 patients	100% of 11 patients*
Percent of heart attack patients given fibrinolytic medication within 30 minutes of arrival	45%	26%	*	0 patients**
Percent of heart attack patients given PCI within 90 minutes of arrival	81%	90%	96% of 401 patients	0 patients**
<b>Surgical Care Improvement<sup>a</sup></b>				
Percent of surgery patients who were given an antibiotic at the right time (within one hour before surgery) to help prevent infection	91%	96%	98% of 4,722 patients	99% of 195 patients
Percent of surgery patients who were given the right kind of antibiotic to help prevent infection	95%	97%	99% of 4,745 patients	99% of 196 patients
Percent of surgery patients whose preventive antibiotics were stopped at the right time (within 24 hours after surgery)	90%	93%	97% of 4,536 patients	94% of 185 patients
Percent of all heart surgery patients whose blood sugar (blood glucose) is kept under good control in the days right after surgery	89%	81%	90% of 753 patients	0 patients**



Percent of surgery patients needing hair removed from the surgical area before surgery, who had hair removed using a safer method (electric clippers or hair removal cream—not a razor)	97%	99%	100% of 5,960 patients	100% of 277 patients
Percent of surgery patients whose doctors ordered treatments to prevent blood clots after certain types of surgeries	88%	90%	98% of 1,942 patients	99% of 165 patients
Percent of patients who got treatment at the right time (within 24 hours before or after their surgery) to help prevent blood clots after certain types of surgery	86%	87%	96% of 1,940 patients	97% of 165 patients

Notes: <sup>a</sup> At the time Carolinas HealthCare was selected for inclusion in the study, 23 HQA measures were used as the selection criteria. Since then, the 25 HQA measures shown here are reported and have become the standard.

\* The hospital data submitted for this measure were based on a sample of cases.

\*\* The number of cases is too small (<25) to reliably tell how well a hospital is performing. “0 patients” – This hospital treated patients in this condition, but no patients met the criteria for inclusion in the measure calculation.

Source: [www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov). Data are from April 2008 through March 2009.

approves the medication list and provides clear instructions on which medications to continue and which pre-hospitalization medications to terminate upon discharge. Nurses must then enter the physician’s directions into the electronic record and print out discharge instructions for the patient related to medication changes. Because of the risk of error in this process, two nurses review and sign discharge instructions. While this process began as part of the efforts to adhere to the heart failure core measures, it has become the standard of practice for all conditions.

CMC–University physicians should gain full access to electronic medical records in stages over the next few years, with the first phase to be rolled out in 2010. For now, the manual process achieves compliance with heart failure patients’ discharge standards over 94 percent of the time—an improvement over the hospital’s starting point of 84 percent just two years ago (Exhibit 4).

**Culture of Safety**

CMC–University participates in the North Carolina Hospital Association’s Just Culture Collaborative. A “just culture” is one in which staff commit to identifying and fixing errors without fear of retribution.<sup>5</sup> In a hospital that embraces just culture, staff speak up when things go wrong, even if they are themselves at fault, so that future mistakes can be prevented. Revealing mistakes and addressing them helps staff succeed in providing better care. CMC–University has

been training staff in the concepts of Just Culture for the past year as part of a two-year collaborative with the North Carolina Center for Hospital Quality and Patient Safety.

Rose Brandau, R.N., chief nursing executive, believes just culture is succeeding at CMC–University because it is consistent with the beliefs and motivation of staff. For example, nurses have embraced National Patient Safety goals related to reducing falls, pressure ulcers, and bloodstream infections, as well as trying to prevent “never events.”<sup>6</sup> Staff in every department identify and work on a performance improvement project, and their efforts have become more sophisticated over time, according to Brandau. In one project dedicated to reducing falls, nurses have begun collecting baseline data on falls, including those that do and do not result in injury. They are using an evidence-based falls assessment tool to predict which patients are at high risk of falling and alert nurses to the need for extra precautions with the highest-risk patients.

**Results**

CMC hospitals began tracking CMS core measures in late 2003. The data above, collected and distributed internally by CMC–University’s Core Measures Team, show a strong positive trajectory for most core

<sup>5</sup> [www.justculture.org](http://www.justculture.org)

<sup>6</sup> [www.jointcommission.org/patientsafety/nationalpatient-safetygoals](http://www.jointcommission.org/patientsafety/nationalpatient-safetygoals); The National Quality Forum’s list of 28 preventable errors hospitals seek to eliminate, such as wrong-side surgeries, retained foreign object, or patient suicide.

measures. By June 2008, all core measure patients at CMC–University received recommended care 94 percent of the time or better on all but one of the measures—initial antibiotic selection for pneumonia patients in the ICU—according to data submitted to CMS by the hospital (Exhibits 3–6).<sup>7</sup>

As described above, medication reconciliation remains the most challenging of the heart failure measures. There has been steady improvement on this indicator, and staff continue to refine the manual reconciliation process until reconciliation can be done electronically. CMC–University’s performance also lags on the measure assessing whether pneumonia patients receive the right antibiotic upon initial assessment. Staff report that physicians had sometimes failed to document when a patient had a risk factor that caused them not to order the antibiotic, thus affecting compliance. Documentation has since been made easier through the inclusion of the risk factor in the electronic order set.

In addition to showing improvement over time, CMC–University performs well on the core measures, compared with national and statewide hospital averages (Exhibit 7). University leads the CMC institutions with the highest individual scores. In the aggregate, 97 percent of CMC–University patients eligible for analysis received care consistent with the recommended standards, placing it in the top 10 percent of all hospitals submitting data to CMS.

Early signs indicate that improvements at individual Carolinas HealthCare System hospitals such as CMC–University have increased the rate of improvement for the system as a whole. Across CMC hospitals, there have been fewer complications and inpatient deaths than expected (based on a case-mix adjusted calculation commonly used), and the gap between actual and expected mortality rates has increased over the past three years.<sup>8</sup>

## Challenges and Lessons Learned

Hospitals seeking to improve performance on the core measures might take the following lessons from CHS–University’s experience:

- Hospital and health system staff interviewed for this case study do not believe that public hospitals are at a disadvantage when it comes to meeting process-of-care standards, relative to their private-sector counterparts. Indeed, CMC–University’s improvement journey shared many steps with those taken by other high-performing hospitals: building multidisciplinary teams, taking guidance from the evidence base, hardwiring improvements, measuring and feeding back data, and assigning accountability to clinicians committed to delivering quality care.
- Since many patients reach inpatient units via the emergency department, it is crucial to have the full support of emergency physicians and hospitalists in achieving care standards.
- Even manual approaches to quality monitoring, such as checklists, can work well for managing care processes. The full implementation of an EMR system is expected to improve the efficiency, and possibly the effectiveness, of the medication reconciliation process at CMC–University, but dramatic progress was made with manual processes and staff-designed workarounds. Hospitals have many resources available for improving quality, and do not have to wait for technology to initiate improvement projects.

## For More Information

For further information, contact Roger Ray, M.D., executive vice president and chief medical officer, at (704) 355-8675.

<sup>7</sup> [www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov), accessed August 2009.

<sup>8</sup> Data provided by CHS, October 2009.

## **APPENDIX. SELECTION METHODOLOGY**

Selection of high-performing safety net hospitals in process-of-care measures for this series of case studies was based on data submitted by hospitals to the Centers for Medicare and Medicaid Services. We considered “safety net” hospitals those that are listed as members of the National Association of Public Hospitals (NAPH) or are government-owned facilities. We then selected safety net hospitals that are in the top quartile among public and private hospitals in an overall hospital quality composite measure. For further information about the public hospital selection process and cross-cutting lessons about their improvement efforts, please see our [introduction](#) to the public hospital case study series. This composite is based on 23 measures that are publicly available on the U.S. Department of Health and Human Services’ Hospital Compare Web site ([www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov)). The 23 measures, developed by the Hospital Quality Alliance, relate to practices in four clinical areas: heart attack, heart failure, pneumonia, and surgical infections.

### **Heart Attack Process-of-Care Measures**

Percent of Heart Attack Patients Given ACE Inhibitor or ARB for Left Ventricular Systolic Dysfunction (LVSD)

Percent of Heart Attack Patients Given Aspirin at Arrival

Percent of Heart Attack Patients Given Aspirin at Discharge

Percent of Heart Attack Patients Given Beta Blocker at Discharge

Percent of Heart Attack Patients Given Fibrinolytic Medication Within 30 Minutes of Arrival

Percent of Heart Attack Patients Given PCI Within 90 Minutes of Arrival

Percent of Heart Attack Patients Given Smoking Cessation Advice/Counseling

Heart Failure Process-of-Care Measures

Percent of Heart Failure Patients Given ACE Inhibitor or ARB for Left Ventricular Systolic Dysfunction (LVSD)

Percent of Heart Failure Patients Given an Evaluation of Left Ventricular Systolic (LVS) Function

Percent of Heart Failure Patients Given Discharge Instructions

Percent of Heart Failure Patients Given Smoking Cessation Advice/Counseling

Pneumonia Process-of-Care Measures

Percent of Pneumonia Patients Assessed and Given Influenza Vaccination

Percent of Pneumonia Patients Assessed and Given Pneumococcal Vaccination

### **Percent of Pneumonia Patients Given Initial Antibiotic(s) Within 4 Hours After Arrival OR Pneumonia Patients Given Initial Antibiotic(s) Within 6 Hours After Arrival**

Percent of Pneumonia Patients Given Oxygenation Assessment

Percent of Pneumonia Patients Given Smoking Cessation Advice/Counseling

Percent of Pneumonia Patients Given the Most Appropriate Initial Antibiotic(s)

Percent of Pneumonia Patients Whose Initial Emergency Room Blood Culture Was Performed Prior to the Administration of the First Hospital Dose of Antibiotics

### **Surgical Care Improvement Process-of-Care Measures**

Percent of Surgery Patients Who Received Preventative Antibiotic(s) One Hour Before Incision

Percent of Surgery Patients Who Received the Appropriate Preventative Antibiotic(s) for Their Surgery

Percent of Surgery Patients Whose Preventative Antibiotic(s) Are Stopped Within 24 Hours After Surgery

Percent of Surgery Patients Whose Doctors Ordered Treatments to Prevent Blood Clots (venous thromboembolism) for Certain Types of Surgeries  
Percent of Surgery Patients Who Received Treatment to Prevent Blood Clots Within 24 Hours Before or After Selected Surgeries

The analysis uses all-payer data from 3rd quarter 2007 through 2nd quarter 2008. To be included in the comparison pool, a hospital must have submitted data for all 23 measures (even if data submitted were based on zero cases), with a minimum of 30 cases for at least one measure in each of the four clinical areas. 2,083 public and private facilities were eligible for the total pool analysis.

No explicit weighting was incorporated, but higher-occurring cases give weight to that measure in the average. Since these are process measures (versus outcome measures), no risk adjustment was applied. Exclusion criteria and other specifications are available at <http://www.qualitynet.org/dcs/ContentServer?cid=1141662756099&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page>.

While public ownership and high score on a composite of process-of-care measures were the primary criteria for selection in this series, the hospitals also had to meet the following criteria: ranked within the top half of hospitals in the U.S. in the percentage of patients who gave a rating of 9 or 10 out of 10 when asked how they rate the hospital overall (measured by Hospital Consumer Assessment of Healthcare Providers and Systems, HCAHPS), full accreditation by the Joint Commission; not an outlier in heart attack and/or heart failure mortality; no major recent violations or sanctions; and geographic diversity.

#### ABOUT THE AUTHOR

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This study was based on publicly available information and self-reported data provided by the case study institution(s). The Commonwealth Fund is not an accreditor of health care organizations or systems, and the inclusion of an institution in the Fund's case studies series is not an endorsement by the Fund for receipt of health care from the institution.

The aim of Commonwealth Fund-sponsored case studies of this type is to identify institutions that have achieved results indicating high performance in a particular area of interest, have undertaken innovations designed to reach higher performance, or exemplify attributes that can foster high performance. The studies are intended to enable other institutions to draw lessons from the studied institutions' experience that will be helpful in their own efforts to become high performers. It is important to note, however, that even the best-performing organizations may fall short in some areas; doing well in one dimension of quality does not necessarily mean that the same level of quality will be achieved in other dimensions. Similarly, performance may vary from one year to the next. Thus, it is critical to adopt systematic approaches for improving quality and preventing harm to patients and staff.

