



# Case Study

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## Gaston Memorial Hospital: Driving Quality Improvement with Data, Guidelines, and Real-Time Feedback

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### **Vital Signs**

*Location:* Gastonia, N.C., near Charlotte

*Type:* Nonteaching, nonprofit hospital

*Beds:* 435

*Distinction:* Top 1 percent of hospitals in composite of 22 process-of-care quality measures among roughly 2,000 hospitals (about half of U.S. acute-care hospitals) eligible for this analysis. Timeframe: Second quarter of 2006 through first quarter of 2007. To be included, hospitals must have submitted data to the Centers for Medicare and Medicaid Services for all 22 measures, with a minimum of 30 cases for at least one measure in each of four clinical areas. See the [Appendix](#) for full methodology.



### **SUMMARY**

Adherence to evidence-based practice guidelines, performance benchmarking and feedback, multidisciplinary committees engaged in root-cause analysis, and strong leadership combined to produce near-perfect compliance with evidence-based process-of-care (“core”) measures in four clinical areas at Gaston Memorial Hospital, near Charlotte, N.C. Hospital leaders also stressed the importance of working closely with the Institute for Healthcare Improvement participating in a demonstration program led by the Centers for Medicare and Medicaid Services (CMS), and identifying physician champions in reducing variance in practice patterns and adhering to best practices.

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## ORGANIZATION

Gaston is a not-for-profit organization established in 1946 as a memorial to all local soldiers who died in World War II. The hospital's current main facility opened in 1973. Specialty centers include CaroMont Cancer Center, CaroMont Heart Center, Neurosciences, Advanced Spine Care, Surgical Services, Psychiatric Services, Birthplace and Neonatal, and the CaroMont Wound and Diabetes Center.

The CaroMont Heart Center provides comprehensive cardiac care, from chest pain evaluation to open heart surgery and post-hospitalization education and support. Procedures include open heart surgery, bypass surgery, valve repair and replacement, diagnostic and interventional care, angioplasty and pacemaker implantation, a cardiac rehabilitation center, and step-down progressive coronary care.<sup>1</sup>

Jan Mathews, R.N., director of clinical performance improvement, leads Gaston's quality improvement initiatives. Gary Gammon, M.D., is the medical director of the Hospitalist Practice at Gaston Memorial. He is a leader in developing order sets to guide physician practice patterns.

In 2003, Gaston Memorial Hospital joined the CMS/Premier hospital quality improvement demonstration project. By the end of 2004, participation in this demonstration, coupled with heightened interest on the part of the Board of Trustees, led the hospital to launch its own quality improvement programs. In 2004, Gaston began reporting data to CMS through the Hospital Quality Alliance program. It also reports on the Hospital Consumer Assessment of Healthcare Providers and Systems measures of patient satisfaction. Gaston focused its quality improvement efforts on patients in the CaroMont Heart Center (heart attack or heart failure patients), patients with pneumonia, and patients who undergo surgery. In addition, some initiatives are hospital-wide.

## STRATEGIES FOR SUCCESS

The main quality improvement goal at Gaston Memorial Hospital is to reduce variance in provider practice patterns. Gaston officials believe that achiev-

ing full or close to complete compliance with these process-of-care measures has the potential to improve the quality of care and save lives. Quality leaders at Gaston credit the CMS demonstration program for "getting them going" on their drive to adhere to evidence-based practice patterns, or order sets.

## Data Analysis and Benchmarking

Gaston collected data on all 22 process-of-care measures and submitted them to CMS. In addition, they used the data to develop profiles of individual physicians, with comparisons to their peers. Gammon credits Gaston's skilled administrative staff with generating timely data on adherence to order sets and tracking physician performance over time.

To identify areas for improvement, Gaston compares its results with statewide data as well as performance levels achieved in other hospitals. The hospital also benchmarks its performance using HealthGrades reports. An important part of the analysis is to look for variances in practice patterns. For heart attack patients, for example, the hospital assesses how much variation occurred in the percent of patients given aspirin at arrival, a beta blocker at arrival, fibrinolytic medication within 30 minutes of arrival, and percutaneous coronary intervention within 90 minutes of arrival. The wider the variance across the hospital, the more likely a procedure will be flagged for improvement.

Each department sets a standard of compliance with various procedures. This may be doing the right thing 95 percent of the time, 97 percent of the time, or, in some cases, 100 percent of the time. Performance data are then examined to determine which physicians comply with these standards.

Gaston also shares its performance information with other hospitals around the state. A group of North Carolina hospitals has developed a listserv ([ncquality.org](http://ncquality.org)) to disseminate best practices.

## Real-Time Feedback to Physicians

Gaston follows a two-step process to bring data to the attention of physicians and encourage them to adhere to evidence-based practices. In the first step, a secre-

tary of the relevant hospital department receives a performance report and sets up a meeting to talk with physicians whose results are sub-optimal. (Secretaries are physicians who are typically next in line to become department chairmen). This is not a formal proceeding, but an informal conversation in which the tenor is, “I thought you would like to know how you stand compared with others in the hospital, and beyond the hospital.” No record of this conversation is placed in the physician’s file.

These discussions frequently indicate that the basis of a problem is not that the wrong thing was done, but that the right thing was not properly documented. In some instances, a physician did not prescribe a certain medication because it was contraindicated, but he or she did not note this in the patient’s file.

If progress is not made following this initial encounter, the physician then goes through a formal peer review, which is documented in the physician’s file. Instead of the secretary of the department, the chairman of the department delivers the message.

Gaston provides performance information to physicians “on the floors” and “at the bedside.” Often, such information is offered to doctors retrospectively (“this is how you did”). The approach at Gaston is to deliver information in real time to physicians in a way they can incorporate into their practices (“this is how you are doing”).

Gammon stresses that a hospital not only has to work with physicians based in that institution, but also with physicians in the community. The latter, he notes,

Gaston feeds performance data to physicians “on the floors” and “at the bedside.”

account for about half of all admissions. Since a number of these physicians are not directly involved in the hospital’s general staff meetings and lack clear feedback channels, it is somewhat more difficult to “get them on the same page” with regard to adhering to practice guidelines and adopting new or emerging best practices. Gammon does frequently initiate contact

with and field inquiries from these physicians in an informal effort to bring their practice patterns in line with those of physicians practicing within the hospital.

### **Multidisciplinary Committees**

Gaston Memorial formed several multidisciplinary committees to delve into the causes of quality problems and develop solutions.

A **Cardiac Care** committee meets monthly to develop, refine, and implement order sets in the areas of heart failure, coronary artery bypass grafts, and heart attack care.

A **Surgical Committee** of surgeons, nurses, anesthesiologists, and respiratory care specialists has developed a Surgical Care Improvement Project. This committee has been carefully examining every aspect of surgery for which quality and patient safety can be improved. In the case of coronary artery bypass graft surgery, the committee might examine pre-surgical procedures such as prep and drape, standardize surgical techniques such as reducing cardiopulmonary bypass time, and implement post-op measures such as alerts to notify attending physicians about problems and glucose monitoring for heart patients who also have diabetes.

There are also committees on **Patient Care/Specialty Care** (with responsibility for improving pneumonia care) and **Emergency Department Quality**. The latter committee is developing initiatives related to “door-to-balloon” care patterns designed to improve patient flow and safety from the moment patients arrive for their angioplasty or surgery.

### **Evidence-Based Practices**

Gaston has focused attention on evidence-based practice guidelines. To begin, any physician who is interested works with Gammon in developing the order sets. Gammon takes the lead to ensure a consistent methodology and format, and consults with specialists as needed (e.g., a pulmonologist for a pneumonia order set). Gammon will compare five to six different order sets for a particular disease. He culls features from these order sets, supplementing or adjusting them based

on the experiences of the physicians at Gaston, so that the final order set is, to some degree, “homegrown.”

The physicians cull features from evidence-based order sets, in some cases supplementing or adjusting them based on their own experiences, so that the final order set is, to some degree, “homegrown.”

All of the order sets follow the same format; this would not be the case if the guidelines were imported from other sources. Gammon believes that this standardization introduces a degree of rigor and consistency that is important to the successful adoption and use of the order sets. For example, an Emergency Department physician who determines that a patient has pneumonia can select this diagnosis on the computer system and immediately view the order set for pneumonia, so that the recommended practices can be followed from the moment of diagnosis.

The formulation and adoption of order sets began with Gaston’s hospitalists, led by Gammon. The hospitalists focused initially on making themselves more efficient, as using order sets can save time as well as promote better outcomes. After having some success, they began to sell the idea of using order sets to specialists, including cardiologists and pulmonologists. They are currently developing an order set for geriatricians.

There is an emphasis on “bottom line” accomplishments and showing results, not just better “inputs” to the hospital production system.

Gaston’s leaders are committed to improving health outcomes through greater adherence to best medical practices. The use of order sets is not an end in itself; the ultimate goals are to lower mortality rates and have fewer complications from surgery, fewer returns to the operating room after surgery, and other targets.

## Participation in National Quality Improvement Initiatives

Gaston attributes its success in part to active participation in national quality improvement programs, which provided technical assistance for data collection and improvement efforts. In addition to the CMS/Premier demonstration project, Gaston has participated in the Institute for Healthcare Improvement’s (IHI) 5 Million Lives Campaign, which aims to avoid 5 million patient injuries over two years. The initiative that has captured the most attention at Gaston is IHI’s “Move Your Dot” program.

The program, supported by a grant from the Robert Wood Johnson Foundation, helps hospitals in measuring, evaluating, and reducing hospital mortality rates. A new methodology was developed to standardize hospital mortality rates in order to fairly compare them. Hospital standardized mortality rates are calculated as the ratio of the actual number of deaths to the expected number of deaths for each hospital, multiplied by 100. The researchers found that only 30 Clinical Classification Systems are needed to cover the diagnoses leading to 80 percent of all deaths.

A “Move Your Dot” improvement project starts with a scatter diagram with “dots,” or data points, plotted on a graph showing the adjusted mortality rates and reimbursement rates for the 1,739 participating hospitals. The higher a hospital’s dot, the higher their mortality rate. The further a hospital is to the right on the graph, the higher the costs. Notably, there is a 450 percent variation across the hospitals in a patient’s chance of dying as well as an 800 percent variation in levels of standardized reimbursement.<sup>2</sup>

Each participating hospital starts by examining where it is on the scatter diagram and how far it has have to go to catch up with the leaders. Next, hospitals use a Hospital Mortality Review Tool to review patient records for 50 consecutive patients who died in their hospitals and determine the number of these patients for whom it was possible to identify a major diagnosis (e.g., pneumonia) and a minor diagnosis (e.g., dehydration) upon admission, the number of cases for which the admission diagnoses matched, and whether the patients

could have been placed into higher-risk categories on admission. This helps identify high-risk patients and apply corresponding protocols, including: increasing the number of nursing and physician contacts; standardizing hand-off processes; identifying attending physicians; reviewing flu vaccine and pneumonia status; using remote monitoring of ICU patients with intensivists and nurses; and establishing partnerships in the community to promote care for patients before they become critically ill. Improvement projects are initiated based on the data reviewed and deficiencies identified.<sup>3</sup>

### **Support from Senior Administrators**

Gaston Memorial officials stress that many if not all of the key elements of quality improvement are supported by senior administrators and the Board of Directors. At least 20 percent of the time of every Board Meeting is reserved for discussions related to quality of care. The Board meets monthly, and improvement issues and updates appear on the agendas of each meeting. The quality improvement director makes a quarterly presentation and progress report to the Board in a standard format. All of the Board members, rather than just a sub-committee, discuss the quality issues and initiatives.

The Board of Trustees asked to be briefed regularly on the implementation and impact of the hospital's quality improvement programs. This is consistent with Gaston's adoption of the Plan-Do-Study-Act approach, which involves collection of baseline information, identification of problems, development of action plans, monitoring of results, and "hard-wiring" innovations that prove successful.

The Board and senior management have established a committee to reduce avoidable mortality—one of five components in the CMS/Premier demonstration of a "360 degree quality package"—in the medical/surgical area as well as critical care.

Most of the quality improvement programs at Gaston Memorial are generated within the hospital or through participation in national quality improvement programs. Hospital leaders note, however, that Blue Cross, Blue Shield of North Carolina's sustained interest in

forming centers of excellence for various procedures has spurred interest among Gaston staff in achieving better performance results. Gaston has submitted performance data to Blue Cross in an effort to be selected as a center of excellence.

### **RESULTS**

Gaston Memorial is among the top 1 percent of hospitals in a composite of 22 process-of-care measures (among about 2,000 hospitals eligible for the analysis). The [Table](#) on page 7 compares Gaston's performance with national and state averages. Gaston has achieved 100 percent compliance with numerous core measure standards.

Gaston has four Centers for Excellence from HealthGrades.<sup>4</sup> Gaston also has five stars in the following areas:

- sepsis;
- respiratory failure;
- chronic obstructive pulmonary disease (COPD);
- community-acquired pneumonia;
- gastrointestinal procedures and surgeries; and
- back and neck surgery (except spinal fusion).

### **LESSONS LEARNED**

A constellation of internal and external factors has been responsible for the achievement of top-level performance at Gaston Memorial Hospital. An emphasis on data analysis, benchmarking to state and national norms, real-time feedback to physicians, and peer review has reduced variations in practice patterns and increased adherence to evidence-based standards. These activities have been reinforced by a strong interest in quality improvement among the hospital's leaders.

A clear lesson from Gaston's experience is that participation in national quality improvement and patient safety programs can jump-start and facilitate homegrown solutions to deficiencies and unexplained variations in medical practice.

Another lesson learned is that the achievement of excellent performance scores does not come quickly



or easily. When evidence of shortfalls is presented, some physicians are likely to champion the cause of reducing variations while others are likely to be wary. Gaston’s use of HealthGrades information showed they had room for improvement in some clinical areas. This helped spur the adoption of evidence-based standards.

According to Jan Mathews, a number of physicians who were initially skeptical of the hospital’s improvement efforts began to say “If they did it, why not me?” after viewing data comparing their performance with other physicians. Some physicians will now check in with Mathews if they have not received feedback and ask “Am I doing things right? You’ll let me know if I fall short, won’t you?”

Mathews and her colleagues view quality improvement as an ongoing journey rather than a plan to be completed. Starting with a few clinical areas as targets of improvement is realistic and feasible; early

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success can bolster confidence and suggest lessons to be applied to subsequent efforts.

Mathews believes that Gaston’s progress toward more complete compliance with best medical practices is replicable in other hospitals. It will require changes in attitudes, investments in information technology, participation in national quality programs, and the real-time use of quality measures to improve physician adherence to evidence-based standards.

**FOR MORE INFORMATION:**

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NOTES

- <sup>1</sup> <http://www.caromont.org/body.cfm?id=33>.
- <sup>2</sup> Institute for Healthcare Improvement, “Move Your Dot: Measuring, Evaluating, and Reducing Hospital Mortality Rates (Part 1),” Innovation Series 2003, p. 6.
- <sup>3</sup> Ibid, pp. 6–9.
- <sup>4</sup> HealthGrades provides ratings and profiles of hospitals and other health care institutions. See <http://www.healthgrades.com>.

**Table. Gaston Memorial Hospital's Scores on 24 CMS Core Measures Compared with State and National Averages**

Indicator	National Average	North Carolina Average	Gaston Memorial Hospital
<b>Heart Failure</b>			
Percent of heart failure patients given discharge instructions	69%	71%	96% of 570 patients
Percent of heart failure patients given an evaluation of LVS function	87	92	100% of 663 patients
Percent of heart failure patients given ACE inhibitor or ARB for LVS dysfunction	87	89	99% of 222 patients
Percent of heart failure patients given smoking cessation advice/counseling	89	94	100% of 152 patients
<b>Pneumonia</b>			
Percent of pneumonia patients given oxygenation assessment	99	100	100% of 852 patients
Percent of pneumonia assessment patients assessed and given pneumococcal vaccination	78	82	99% of 600 patients
Percent of pneumonia patients whose initial emergency room blood culture was performed prior to the administration of the first hospital dose of antibiotics	90	90	98% of 585 patients
Percent of pneumonia patients given smoking cessation advice/ counseling	85	92	100% of 397 patients
Percent of pneumonia patients given initial antibiotics within six hours after arrival	93	93	98% of 436 patients
Percent of pneumonia patients given the most appropriate initial antibiotic(s)	87	87	99% of 364 patients
Percent of pneumonia patients assessed and given influenza vaccination	75	80	98% of 202 patients
<b>Heart Attack</b>			
Percent of heart attack patients given aspirin at arrival	94	93	99% of 391 patients
Percent of heart attack patients given aspirin at discharge	91	92	100% of 367 patients
Percent of heart attack patients given ACE inhibitor or ARB for LVS dysfunction	88	87	95% of 81 patients
Percent of heart attack patients given smoking cessation advice/counseling	92	94	100% of 186 patients
Percent of heart attack patients given beta blocker at discharge	92	94	99% of 388 patients
Percent of heart attack patients given beta blocker at arrival	89	91	98% of 265 patients
Percent of heart attack patients given fibrinolytic medication within 30 minutes of arrival	40	43	100% of 2 patients <sup>1</sup>
Percent of heart attack patients given PCI within 90 minutes of arrival	67	80	84% of 74 patients
<b>Surgical Care Improvement/Surgical Infection Prevention</b>			
Percent of surgery patients who received preventive antibiotics one hour before incision	84	89	98% of 893 patients <sup>2</sup>
Percent of surgery patients who received the appropriate preventive antibiotics for their surgery	91	92	97% of 902 patients <sup>2</sup>
Percent of surgery patients whose preventive antibiotics are stopped within 24 hours after surgery	82	84	96% of 829 patients <sup>2</sup>
Percent of surgery patients whose doctors ordered treatments to prevent blood clots (venous thromboembolism) for certain types of surgeries	80	83	95% of 1063 patients <sup>2</sup>
Percent of surgery patients who received treatment to prevent blood clots within 24 hours before or after selected surgeries	77	78	92% of 1063 patients <sup>2</sup>

Note: ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blockers; LVS = left ventricular systolic; PCI = percutaneous coronary intervention.

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

<sup>2</sup> Measure reflects the hospital's indication that its submission was based on a sample of its relevant discharges.

Source: [www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov) Accessed on 11/10/08. Data are from CY 2007.

## **APPENDIX. SELECTION METHODOLOGY**

Selection of high-performing hospitals in process-of-care measures for this series of case studies is based on data submitted by hospitals to the Centers for Medicare and Medicaid Services (CMS). We use 22 measures that are publicly available on the U.S. Department of Health and Human Services' Web site, Hospital Compare ([www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov)). The 22 measures, developed by the Hospital Quality Alliance (HQA), 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 Arrival  
 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  
 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/Surgical Infection Prevention 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

The analysis uses all-payer data from the second quarter of 2006 through the first quarter 2007. To be included, a hospital must have submitted data for all 22 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. Approximately 80 percent of U.S. acute care hospitals submitted data on the 22 measures. Approximately 2,000 facilities—about half of acute care hospitals—were eligible for the 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>



#### ABOUT THE AUTHORS

Jack Meyer, Ph.D., is a principal in the Washington, D.C. office of Health Management Associates, a research and consulting firm specializing in health care, and a visiting professor in the Graduate School of Public Policy at the University of Maryland. He was the founder and president of the Economic and Social Research Institute (ESRI). Dr. Meyer has conducted policy analysis and directed research on health care access issues for several major foundations as well as federal and state government. Many of these projects have highlighted new strategies for building quality measurements and improvement into health care purchasing. Dr. Meyer has also directed studies on overcoming barriers to health care access and on innovative designs for extending health insurance coverage to the uninsured. He is the author of numerous books, monographs, and articles on topics including health care, welfare reform, and policies to reduce poverty. Dr. Meyer received a Ph.D. in economics from Ohio State University.

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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.

