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Case Study

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Kettering and Sycamore Medical Centers: Committing Resources to Surgical Quality

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Vital Signs

Location: Kettering and Miamisburg, Ohio

Type: Private, not-for-profit teaching hospitals

Beds: Kettering Medical Center–481; Sycamore Medical Center–181

Distinction: Both hospitals, part of the Kettering Health Network, scored in the top 3 percent in composite of five surgical care improvement process-of-care measures among more than 2,300 hospitals (more than half of U.S. acute-care hospitals) eligible for the analysis.

Timeframe: April 2007 through March 2008. See Appendix for full methodology.

This case study describes the strategies and factors that appear to contribute to high performance on surgical care improvement measures at Kettering and Sycamore Medical Centers. It is based on information obtained from interviews with key hospital personnel and materials provided by the Kettering Health Network during April and May 2009.

SUMMARY

In early 2000, the Hospital Quality Alliance (HQA) developed process-of-care measures to encourage hospitals to deliver evidence-based treatment in four clinical areas—heart attack, heart failure, pneumonia, and surgical care. As part of their participation in the Hospital Quality Incentive Demonstration, Kettering Health Network's (KHN) hospitals began preparing for data reporting in early 2003, and the first year of data (2004) showed that all KHN hospitals were among the top performers on all of the process-of-care, or "core" measures. This case study focuses on performance on the five surgical care improvement project (SCIP) measures collected and reported by the Centers for Medicare and Medicaid Services (CMS) in 2007 and 2008.[1] Two of the network's hospitals,

Kettering Medical Center and Sycamore Medical Center, scored among the top 3 percent of U.S. hospitals on the five surgical 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

This case study also discusses Kettering and Sycamore's performance on two other surgical care measures, for which CMS began reporting data this year. The measures were not part of the selection criteria for this case study.

- Percent of all heart surgery patients whose blood sugar (blood glucose) is kept under good control in the days right after surgery
- 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)

Leaders at both Kettering and Sycamore attribute their success to having made investments in staff. In 2005, Liz Wise, R.N., then vice president for clinical quality at Kettering and Sycamore, developed a quality department shared among the two hospitals. Further, the hospitals have made nurses key to their improvement strategy. Chris Turner, M.S., R.N., current vice president for clinical quality at Kettering and Sycamore Medical Centers, said, "I cannot stress enough the importance of involving bedside nurses in process design, education, and performance improvement activity—they are the most important link to the results we are achieving."

In addition, the hospitals have focused on national quality initiatives, such as achieving Nursing Magnet status and the Malcolm Baldrige National Quality Award.[2]

The biggest change at the two hospitals in recent years was the introduction of concurrent quality monitoring and feedback to providers and managers. The use of real-time data—on patients who are still in the hospital—has inspired competition and greater accountability among physicians and nurses, resulting in near-perfect compliance with recommended surgical processes.

ORGANIZATION

Kettering Medical Center is the flagship hospital of the Kettering Health Network. It is a 481-bed facility located in Kettering, just outside Dayton, Ohio. Sycamore Medical Center is a 183-bed hospital in the Dayton suburb of Miamisburg. Kettering and Sycamore collaborate closely, including sharing a quality management team and a surgical care improvement workgroup. The other hospitals in the health system are Grandview Medical Center, Southview Medical Center, and Greene Memorial Hospital, all of which share Kettering Health Network's mission and goals but have separate quality improvement staff. The system also owns an inpatient behavioral health facility, multiple outpatient facilities, a physician group, and a research institute. The parent organization is Kettering Adventist HealthCare, which is affiliated with the Seventh-day Adventist denomination.

NETWORK-WIDE STRATEGIES

Kettering Health Network's journey to becoming a high-quality organization dates to 1994, when Frank Perez, M.H.A., FACHE, was hired as chief executive officer. Perez brought with him a passion for quality improvement, which led to the system's investment in staff and processes to promote and improve the quality of care.

Committing Ample Resources

According to Rebekah Wang, M.D., FACP, when she joined Kettering Health Network in September 2007 as medical director for clinical quality the health system was already "resource rich." More than 100 people were working to promote the quality agenda, including a decision support group, infection control staff, case managers, social workers, clinical documentation specialists, patient relations staff, accreditation and regulatory compliance staff, and medical and surgical clinical outcomes teams. Many more hospital staff served on teams devoted to particular improvement initiatives.

Wang also found that the network's low mortality rate, costs, and length of stay were exemplary. She attributes the system's enviable performance on both cost and quality to its participation in the CMS/Premier pay-for-performance demonstration, starting in 2004, and in QUEST, a national quality benchmarking initiative of Premier Healthcare. Sycamore was a founding member of the QUEST initiative in 2007.[3] Even though surgical care plays a minor role in these initiatives, they helped create a platform for the hospitals' surgical improvement work. The Institute for Healthcare Improvement's national surgical care improvement listserv has enabled the hospitals to share lessons and discuss challenges with other organizations.

Recognizing Superior Performance

Hospital leaders write notes and deliver personal messages in order to express their appreciation for staff members' hard work, believing that such recognition fosters personal commitment to quality improvement. The inverse is also true: staff who do not meet the network's standards are counseled about their performance.

Kettering Health System also recognizes success through its Excellence for Life program. Last year, eight teams earned awards, including the Opportunity for Improvement team and the Core Measures Process Improvement team.

SURGICAL CARE IMPROVEMENT STRATEGIES

Quality improvement at Kettering and Sycamore Medical Centers is driven by concurrent review of performance data, promotion of evidence-based practices, and data feedback to providers. Kettering and Sycamore's shared quality department relies on two electronic support systems: MIDAS and PICIS. MIDAS has a module for online event reporting that enables staff to quickly and easily report a patient safety event, such as an adverse drug reaction, patient fall, medication error, "never" event (e.g., wrong-site surgery or retained foreign object), operating room (OR) procedural complication, or other aberration from best practice. PICIS is an OR electronic system used by the circulating nurse to input details of surgical care, such as the timing of antibiotic administration and of incision, both of which are related to CMS surgical care measures. In 2010, EPIC will be implemented at all of the Kettering Health Network hospitals; this fully integrated electronic health record system will further facilitate clinical decision support and performance monitoring.

Performance improvement efforts in surgery rely on these same strategies and tools. The clinical operations director of perioperative services at Sycamore, Kyle Kalbaugh, R.N., plays a crucial role in setting expectations for excellence, developing teamwork in the OR suite, and ensuring that education occurs on a consistent basis. As new core measures are introduced, Kalbaugh works closely with quality staff to set standards and design better care processes, and then uses the plan-do-check-act cycle to determine which changes are valuable and which have no effect on the quality of care.

Evidence-Driven Change

Wang shares with physicians the latest evidence on best care practices and changes to the core measure specifications and works with them to design improvements. She attends section meetings (e.g. for cardiothoracic surgery, urology, hospitalists, anesthesiology), distributes copies of relevant research studies, and

shows surgeons and internists both group and individual outcomes data on the surgical measures.

Once a process improvement is accepted through this clinical review process, quality improvement staff disseminate the new standard and educate staff about its use. Order sets are created specifying each component of a patient's care, and chart review specialists conduct concurrent reviews to assess compliance with the new standard.

"When they understand the rationale behind the practice and see the need for improvement in our statistics, they become personally invested in making changes," Wang says. To keep track of best surgical practices, she relies on published literature, CMS and Agency for Healthcare Research and Quality reports, Institute for Healthcare Improvement and QUEST initiatives, and her staff.

Eventually, a protocol is developed to hardwire the new care practice.[4] "We try to make it easy for all staff to deliver the best care," says Wang. From start to finish, a process improvement can be designed, tested, and put forward for adoption in as little as six to eight weeks and then audited to measure its effects.

Concurrent Review

From mid-2005 through January 2008, Kettering and Sycamore tested the use of concurrent review to identify variances from CMS core measures. Clinical documentation specialists—nurses with many years of surgical or ICU experience—reviewed patient charts to see if core measures were being met. They discussed and reported variances from the standards with clinical nurse managers on the units where they occurred in an effort to educate staff and possibly improve care before patients were discharged. Some variances (also called opportunities for improvement, or OFIs) could be remedied while patients were still hospitalized. Some were time sensitive and could not be corrected, but still provided a learning opportunity. For example, if the preoperative antibiotic was not started within one hour of incision time because a surgeon arrived late, the provider would have been counseled and the variance noted and tracked.

Monitoring and reporting on variances was valuable, but did not result in the marked improvement that staff and leadership sought. Wise challenged the quality staff to reduce variances by 50 percent compared with 2007 levels. Beginning in January 2008, a new strategy that heightened the level of attention and response to variances from recommended care was implemented. Now, when clinical document specialists identify a variance, they immediately send an e-mail to notify several hospital personnel, including clinicians, managers, and quality specialists. The nurse manager is required to respond to the OFI team with details about the circumstances, and then Wang contacts the clinicians to discuss the deviation. If a pattern of variances is detected by virtue of multiple e-mails in a day or a week, it may be discussed the next day during daily "huddles," or rounds.

In addition to the immediate alerts, Susie Peil, R.N., clinical data analyst at Kettering, sends a weekly report to all nursing units, clinical nurse managers, nursing clinical directors, and service line leaders at both hospitals summarizing the variances from the core measures that occurred during the previous week. This enables staff to identify problems and track trends in performance. Peil also generates a monthly report showing rolling 12-month performance rates.

This system of review and accountability has been effective in lowering variances. By the end of 2008, variances from surgical care measures were 60 percent lower than in the first six months of 2007, exceeding Wise's target. As of August 2009, Sycamore experiences an average of 1.25 variances a month, or three per 100 surgical cases, and Kettering has 8.6 variances a month, or four per 100 surgical cases (based on a 12-month rolling average). Of these, about a third were able to be remedied before patients left the hospital, and about two-thirds were either reported as a failure or ultimately deemed not eligible for reporting.

In addition to the attention by managers, variances are reviewed retrospectively by the SCIP Improvement Process Group, which is co-chaired by Beverly Schneider and Karen Gorby, R.N., M.S.N., M.BA., Kettering Medical Center's director of surgery, and meets every other month. They look for opportunities to change the way care is delivered to ensure quality goals are met. For example, after noting that surgeons sometimes ordered the wrong preoperative antibiotic for a procedure, Wang and Schneider put circulating nurses in charge of preoperative antibiotic selection, based on the SCIP antibiotic table. This new process was presented to the OR Committee and approved by the Medical Executive Committee. Since beginning this process in the spring of 2009, variances for antibiotic selection have decreased.

Practice Improvements

Antibiotic Selection and Timing

Three of the HQA surgical measures relate to the choice and timing of antibiotics administration. Kettering and Sycamore followed the improvement process described above—using research and data collection—to convince clinicians to standardize their antibiotic choices and administration processes. This led to the development of a standard order set for antibiotic administration. Nearly all physicians now use this order set, though they can make different choices if they document the reason for doing so.

In a recent review of six months of variance reports, 96.5 percent of 1,322 patients received all appropriate antibiotic administration. Among the 48 patients (3.5%) who did not, the most frequent error was failure to discontinue antibiotics within 24 hours of surgery. Quality staff noted that giving three doses of antibiotics, each spaced eight hours apart, can prove challenging. If for example a surgery ends late in the evening, the first postoperative dose might be given later than expected and the last dose would then be given after the 24-hour time frame. Wang introduced information from the national SCIP listserv showing that other hospitals had experimented with giving just a single dose of antibiotics and found this was as effective in controlling infection as numerous doses and, further, reduced the likelihood of patients developing antibiotic resistance to the *clostridium difficile* bacteria. The hospitals' Pharmacy and Therapeutics Committee approved reducing the number of antibiotic administrations from three to two, and eventually to one—a change that will avoid the possibility of administering antibiotics more than 24 hours after surgery and reduce the risk of antibiotic resistance. However, physicians are still reluctant to make this change.

Clipping Practices

One of the new HQA surgical care measures monitors the method of hair removal prior to surgery; use of clippers, rather than razors, has been shown to reduce infection rates. At Sycamore, razors were removed from the ORs, but some surgeons continued to bring their own. These surgeons were counseled by their clinical leaders and eventually conformed to practice standards. Kettering had one recalcitrant physician who ultimately accepted the new policy as well.

Glucose Control

Another new surgical measure monitors appropriate management of blood glucose level after surgery, in order to decrease the risk of infection. Kettering Medical Center had been appropriately managing surgical patients' glucose levels over the 18-month period proceeding March 2009. Then in March 2009, two patients experienced elevated glucose levels after surgery, and the SCIP team could not identify the causes. Wang used the national SCIP listserv to solicit suggestions for ways to control glucose levels, and she is currently discussing these strategies with the nurses.

Normothermia

Keeping surgery patients at the appropriate temperature, called normothermia, has been shown to reduce incidence of wound infection. Beginning in October 2009, CMS requires hospitals to report compliance with normothermia measures for all patients, rather than only colorectal patients, as hospitals had been

doing previously. Sycamore and Kettering have routinely measured postoperative temperatures on all patients and are thus well positioned to meet this new care standard.

RESULTS

Sycamore and Kettering both exceed state and national standards on all surgical process-of-care measures. Exhibit 1 displays the most recent year of data for both hospitals on the surgical measures, including the two newest ones.

Exhibits 2 and 3 show trends over time at Kettering and Sycamore for surgical care "bundles". The bundles combine several measures; a patient has to have received appropriate care for each measure in the bundle in order for the hospital to receive credit for that bundle.

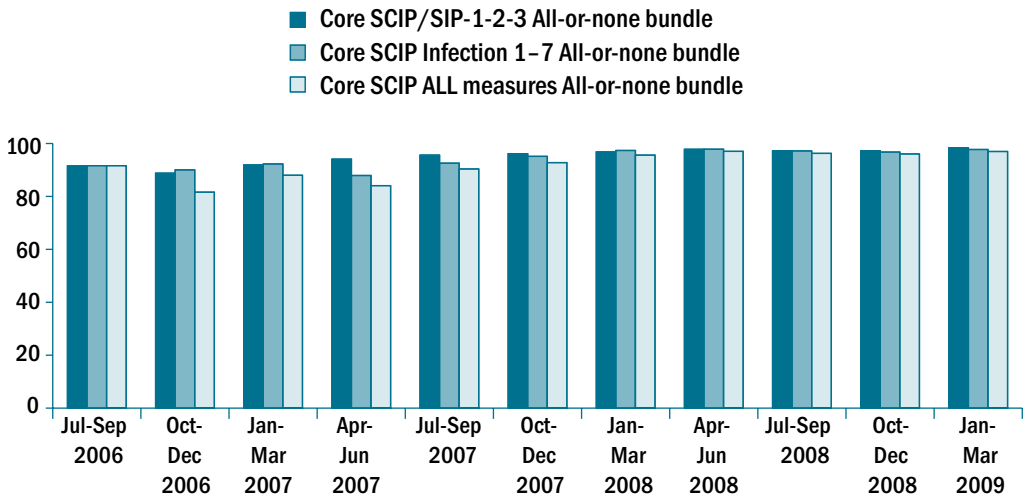
Local papers have written about the health system's performance on CMS measures, likely leading physicians in the community to send their patients to Sycamore and Kettering. Both medical centers also have achieved recognition from local and national organizations.

The Ohio Partnership for Excellence, the state Baldrige quality program, gave Kettering Health Network the 2009 Gold Level Award, a recognition for organizations that have demonstrated significant progress toward excellent performance. Organizations recognized at this level must demonstrate results that are directly attributable to deployment of a systematic approach.

Exhibit 1. Sycamore Medical Center and Kettering Medical Center Scores on Surgical Care Improvement Core Measures Compared with State and National Averages

Surgical Care Improvement Indicator	National Average	Ohio Average	Sycamore Medical Center	Kettering Medical Center
Percent of surgery patients who were given an antibiotic at the right time (within one hour before surgery) to help prevent infection	87%	90%	98% of 262 patients	99% of 2,001 patients
Percent of surgery patients who were given the right kind of antibiotic to help prevent infection	93%	95%	98% of 264 patients	99% of 2,021 patients
Percent of surgery patients whose preventative antibiotics were stopped at the right time (within 24 hours after surgery)	86%	88%	100% of 244 patients	99% of 1,914 patients
Percent of all heart surgery patients whose blood glucose is kept under good control in the days right after surgery	84%	86%	0 patients	99% of 244 patients
Percent of surgery patients needing hair removal from the surgical area before surgery, who had hair removed using a safe method (electric clippers or hair removal cream, not razor)	95%	98%	100% of 304 patients	100% of 2,174 patients
Percent of surgery patients whose doctors ordered treatments to prevent blood clots after certain types of surgeries	86%	90%	98% of 361 patients	100% of 1,852 patients
Percent of surgery 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	83%	88%	97% of 361 patients	99% of 1,852 patients

Source: www.hospitalcompare.hhs.gov. Data are from October 2007 through September 2008.

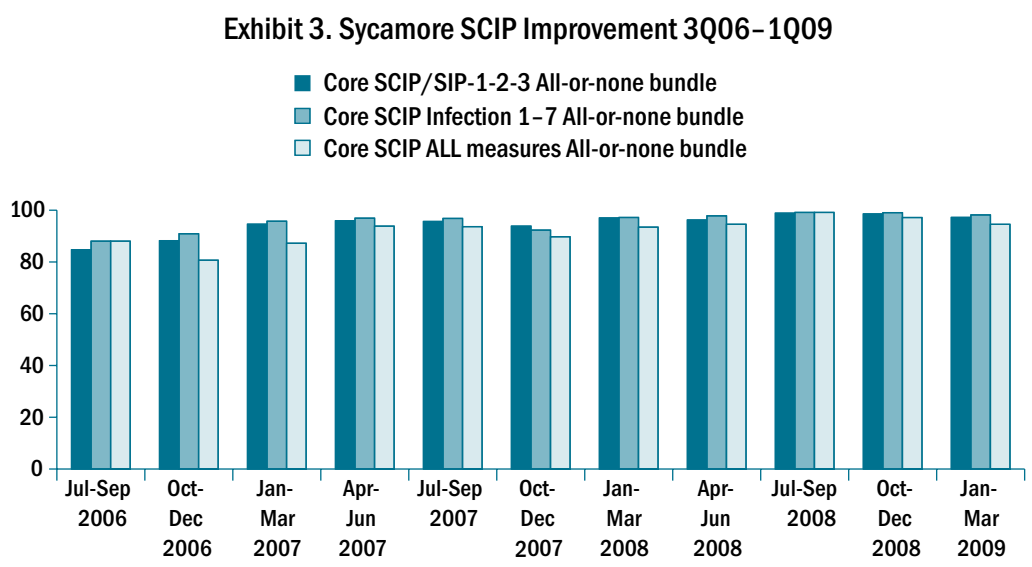


Source: Quality Department, Kettering Health System, May 2009.
Notes: "Core SCIP1-2-3" includes the three antibiotics measures. "All-or-none" means that care is considered compliant only if all three care processes were delivered.
"Core SCIP Infection 1–7" includes the antibiotic measures as well as blood glucose monitoring, appropriate hair removal, and normothermia. Only patients who receive all care processes are counted as successes.
"Core SCIP ALL measures" includes 1–7 plus the measures of β-blocker therapy and receipt of venous thromboembolism (VTE) prophylaxis before and after surgery.

CHALLENGES AND LESSONS LEARNED

The breadth and volume of staff resources Sycamore and Kettering have committed to quality measurement and improvement has likely contributed to the hospitals' progress over the last two years. Hospitals seeking to improve their performance on surgical measures might take the following lessons from Sycamore's and Kettering's experience:

- Having adequate staff members devoted to measuring, improving, and monitoring care processes, and who work well as a team, is essential.



Notes: "Core SCIP1-2-3" includes the three antibiotics measures. "All-or-none" means that care is considered compliant only if all three care processes were delivered.
"Core SCIP Infection 1–7" includes the antibiotic measures as well as blood glucose monitoring, appropriate hair removal, and normothermia. Only patients who receive all care processes are counted as successes.
"Core SCIP ALL measures" includes 1–7 plus the measures of β-blocker therapy and receipt of venous thromboembolism (VTE) prophylaxis before and after surgery.
Source: Quality Department, Kettering Health System, May 2009.

- Medical directors can engage surgeons in the improvement process by educating them about the CMS requirements and the medical literature on evidence-based care, and by providing them with information about their performance.
- Concurrent review of care processes, including prompt notification of all involved parties and responses from managers, can dramatically improve performance.
- Coaching, counseling, and educating are key to engaging staff in quality improvement. A punitive approach will result in resentment and fear.

Kettering and Sycamore face challenges in sustaining and building on their records of high performance. Implementation of an enterprise electronic health record system throughout the Kettering Health System will require staff to learn new processes for collecting and charting data, though in the long run such a system should produce better processes for tracking performance.

FOR MORE INFORMATION

For further information, contact Rebekah Wang, M.D., medical director for clinical quality, Kettering and Sycamore Medical Centers, (937) 395–8891.

NOTES

[1] The CMS Web site, Hospital Compare, uses the name "Kettering Medical Center – Sycamore" in reference to Sycamore Medical Center. Hospital Compare also reports the hospital size as 120 beds, while Sycamore Medical Center reports 183 beds.

[2] Magnet status is an award given by the American Nurses' Credentialing Center, an affiliate of the American Nurses Association, to hospitals that satisfy a set of criteria designed to measure the strength and quality of their nursing. The Malcolm Baldrige National Quality Award is an annual award that recognizes U.S. organizations in the business, health care, education, and nonprofit sectors for performance excellence.

[3] The CMS/Premier Hospital Quality Incentive Demonstration rewards high quality of inpatient care by awarding bonus Medicare payments to hospitals in several clinical areas and by reporting performance data on the CMS Web site, Hospital Compare. QUEST is a voluntary, nationwide collaborative aimed at improving the quality and efficiency of hospital care. See premierinc.com/quality-safety/tools-services/quest/index.jsp.

[4] A protocol provides direction through each step of a patient's care, depending on his or her progress. For example, a protocol can describe criteria for weaning a patient from a ventilator. By contrast, an order set includes fixed instructions that are not altered based on a patient's condition.

[5] Two additional surgical care improvement measures were added in 2007 but were not included in the composite score for selection purposes because data were not available for four quarters.

APPENDIX. SELECTION METHODOLOGY

Selection of high-performing hospitals for this series of case studies on surgical care is based on data submitted by hospitals to the Centers for Medicare and Medicaid Services. We use five measures that are publicly available on the U.S. Department of Health and Human Services' Hospital Compare Web site, (www.hospitalcompare.hhs.gov). The measures, developed by the Hospital Quality Alliance, relate to practices in surgical care.

Surgical Care Improvement Process-of-Care Measures

1. Percent of surgery patients who received preventative antibiotic(s) one hour before incision
2. Percent of surgery patients who received the appropriate preventative antibiotic(s) for their surgery
3. Percent of surgery patients whose preventative antibiotic(s) are stopped within 24 hours after surgery
4. Percent of surgery patients whose doctors ordered treatments to prevent blood clots (venous thromboembolism) for certain types of surgeries
5. 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 April 2007 through March 2008. To be included, a hospital must have submitted data for all five measures (even if data submitted were based on zero cases), with a minimum of 30 cases for at least one measure, over four quarters.[5] Approximately 2,300 facilities—more than half of U.S. 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).

While high score on a composite of surgical care improvement process-of-care measures was the primary criteria for selection in this series, the hospitals also had to meet the following criteria: not a government-owned hospital, at least 50 beds, not a specialty hospital, 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 the 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

Jennifer N. Edwards, Dr.P.H., M.H.S., is a principal with Health Management Associates' New York City office. Jennifer has worked for 20 years as a researcher and policy analyst at the state and national levels to design, evaluate, and improve health care coverage programs for vulnerable populations. She worked for four years as senior program officer at The Commonwealth Fund, directing the State Innovations program and the Health Care in New York City program. She has also worked in quality and patient safety at Memorial Sloan-Kettering Cancer Center, where she was instrumental in launching the hospital's Patient Safety program. Jennifer earned a Doctor of Public Health degree at the University of Michigan and a Master of Health Science degree at Johns Hopkins 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.