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Case Study

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NorthShore University Health System: Achieving Rapid Improvement on Core Measures

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Vital Signs

Location: Evanston, Illinois, a northern suburb of Chicago

Type: Teaching, not-for-profit community hospital system

Beds: 650 beds across three hospitals

Distinction: Top 1 percent of hospitals in composite of 24 process-of-care quality measures among roughly 2,000 hospitals (about half of U.S. acute-care hospitals) eligible for the analysis.

Timeframe: Calendar year 2007. To be included, hospitals must have submitted data to the Centers for Medicare and Medicaid Services (CMS) for all 24 measures, with a minimum of 30 cases for at least one measure in each of four clinical areas. See Appendix A for full methodology.

SUMMARY

In 2007, NorthShore University Health System achieved 97 percent compliance with Centers for Medicare and Medicaid Services (CMS) process-of-care measures, a 12-point increase from just one year before.[2] The measures, developed by the Hospital Quality Alliance, relate to achievement of recommended treatment in four clinical areas: heart attack, heart failure, pneumonia, and surgical care.

NorthShore's rapid improvement was triggered by a conversation between the president and chief executive officer of the health system, Mark Neaman, and Liz Behrens, R.N., M.S.N., vice president of quality improvement, during which Behrens suggested that NorthShore make CMS core measures a priority. With high-level endorsement, NorthShore pursued the following improvement strategies:

- a system-wide staff education initiative led by the quality department, including the essential engagement of medical staff, pharmacists, and nurses;

- promoting physician buy-in by encouraging them to contact CMS with questions about the care standards;
- use of an electronic health record (EHR) system as a tool in education, care management, and performance tracking; and
- use of real-time data for concurrent review of patient care, made possible by exporting data from the EHR.

NorthShore has sustained its performance improvements, scoring 96 percent or higher on 23 of the 25 core measures through June 2008.

ORGANIZATION

Evanston Northwestern Healthcare was formed in 2000 through the merger of three Chicago-area hospitals: Evanston Hospital, founded in 1891, Glenbrook Hospital, established in 1977, and Highland Park Hospital. A fourth institution, Skokie Hospital, joined in January 2009. The health system also includes a research institute, a home health care provider, and a network of physicians' offices. It is a training site for the University of Chicago's Pritzker School of Medicine. In November 2008, the system changed its name to NorthShore University Health System.

STRATEGIES FOR SUCCESS

Improvement efforts at NorthShore have been widespread and involved doctors, nurses, pharmacists, information systems specialists, discharge planners, quality improvement staff, and executives. The most important strategy, according to Behrens, was the move from retrospective data review for patients who had already been discharged to concurrent monitoring of patients, which allows for improvements in care while there is still time. Concurrent monitoring enables physicians to identify instances when their care choices do not meet standards, giving them a chance to change their orders. By raising their awareness of gaps in care, doctors and quality staff were able to design better and more reliable processes for achieving quality goals.

System-Wide Staff Education

NorthShore's transformation began with the introduction of the CMS process-of-care measures to staff across the three hospitals. At that point, Behrens and her team learned that many physicians were committed to their usual practices, particularly the use of certain drugs. Some were difficult to engage because they felt certain measures, such as prevention of deep-vein thrombosis among orthopedic patients, were not relevant to their patients.

To promote acceptance of the quality measures, NorthShore formed teams of physicians, nurses, and pharmacists to review, discuss, and adapt the CMS care standards. Teams examined existing care practices at NorthShore and found wide variations. In the end, they were convinced by the evidence base demonstrating the effectiveness of the recommended processes of care. The teams developed care processes consistent with the CMS indicators, specifying cases in which exceptions should be allowed. Pharmacists played an important role, ultimately becoming powerful advocates for the pharmaceutical standards, such as the correct use, timing, and discontinuation of antibiotics. Care processes were codified in order sets in the health system's EHRs. The high level of clinician buy-in has carried through to subsequent quality improvement efforts.

All NorthShore Nurses were trained in the new care processes and the stringent compliance standards. Their involvement on the review teams led to changes in nursing processes, including daily rounds (discussed below).

Connecting Physicians to CMS

While the initial work by clinical teams was critical, engaging all of NorthShore's physicians continued to be a challenge. Behrens noted in particular the difficulty of making clear that care could not be considered compliant with CMS measures unless it was delivered—and documented—according to standards. Physicians who questioned the requirements were encouraged to submit their questions to QualityNet, a quality improvement Web site created by CMS. CMS representatives responded directly to physicians. When

the message was delivered by a health care payer, rather than the hospital's quality department, it held more weight. Behrens believed that engaging doctors in the discussions about the appropriateness of documenting care and exceptions has transformed their role in quality improvement.

With time, the medical staff began to embrace the quality goals and work out some of the challenges in meeting the new care standards. For example, cardiologists and emergency department physicians spent time reviewing cases to reach agreement on which patients should be considered eligible for the heart attack and heart failure protocols. They reviewed all heart attack patients with ST-segment elevations (known as STEMI patients) within 24 hours of arrival, to determine how well care processes worked and define new protocols where needed. Clear inclusion and exclusion criteria reduced the likelihood that a patient eligible for a particular protocol would be missed. Plus, working through the requirements improved physicians' documentation of care. As a result of this type of improvement process, Behrens says that physicians and other stakeholders, rather than the quality department, "own their outcomes."

Real-Time Data: The End of "Hinting and Hoping"

Before 2006, NorthShore's quality department used data in what it described as a "hinting and hoping" style. In an attempt to inspire improvement, the department posted data illustrating deficiencies in care or documentation. The data were four to six months old. When quality staff asked physicians why a patient's care was outside the norm, they often could not remember the circumstances that may have justified the exception to care standards—and the chance to document it was long gone. Such efforts did not lead to changes in clinical behavior.

In 2006, the quality department instituted a new system of data reporting to help track adherence to core measures and support daily rounding. Each night, data from the EHRs are automatically exported to the data warehouse for aggregation by measure. This greatly reduces the time spent by quality staff manipulating data and enables them to alert clinicians about gaps in quality while patients are still in the hospital. Introduction of this reporting system would not have been possible without an EHR. To serve additional needs, the daily reports are aggregated for review at weekly meetings or by managers.

A daily tracking report is automatically generated from the data warehouse for each unit, showing which patients are up-to-date on core measures and which have needs to be addressed (highlighted in yellow) (Exhibit 1). The tracking report is used in an auditing process created by the nursing staff. For each patient with a condition related to the core measures, nursing unit leaders review the care processes with the floor staff during daily 15-minute rounds. The report makes it easy to see where nursing actions are needed, helping to ensure that medications are provided on a schedule and patients receive appropriate education. This system has led to interventions prior to patient discharge, as well as proper documentation of reasons for non-compliance with the care standards. Nurses also use the tracking reports to review patterns of missed care and redesign systems when needed.

The pharmacy department also performs daily monitoring using EHRs. Pharmacists check on new-core-measure patients, verifying that the appropriate medications have been ordered. Physicians and pharmacists confer when opportunities to change medication are identified. In addition, pharmacists review the end time of a procedure to ensure that antibiotics are scheduled to be completed within 24 hours after surgery.

Electronic Health Record Tools

In addition to facilitating concurrent reviews of patient care, NorthShore's EHR has given staff tools to sustain success, according to Maureen Kharasch, director of quality and patient safety. For example, the system's Vaccine Navigator helps nurses work through the inclusion/exclusion criteria to determine if a patient is eligible to receive the pneumonia vaccine (Exhibit 2). If criteria are met, a nurse follows a link provided to place the preapproved vaccine order.

Exhibit 1. Daily Tracking Report

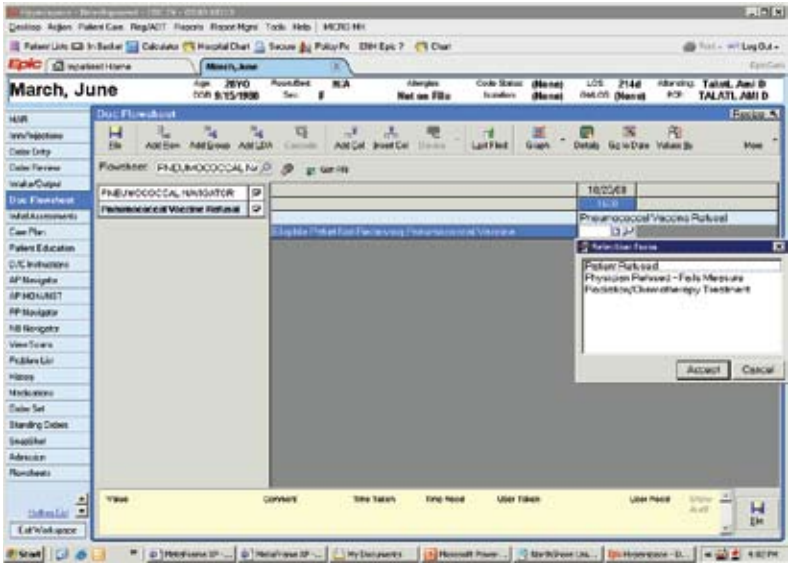
UNIT/ ROOM	PROCEDURE	ANTIBX INF TIME	ANTIBX TYPE	Appropriate Abx Y/N	PROC START	PROC END	Last Dose ABX date/time	PACU 1ST TEMP (colon only)	Heparin or Lovenox	Glucose Control (CABG & Valve Rep.)	TEDs/ SCDs in place	SCIP 1- Abx w/in 1 hr	SCIP 3- ABX d/c'd w/in 24hr	SCIP Post op temp >96.8
3951	SIGMOID RESECTION	16:00	Unasyn	y	16:45	18:25		97	Heparin	N/A	Y	Y		Y
3938	TAH,BSO, POSS NODE DISSECTION	12:40, 12:55	Amp, Genta	n	13:05	17:35	8/16/07, 04:00	N/A	N/A	N/A	Y	Y	Y	N/A
4978	LEFT HEMICOLECTOMY	11:30, 11:40	Flagyl, Levo		12:02	14:33	8/18/07, 11:00	98.6	Heparin	N/A	Y	Y	Y	Y
4406	LEFT HIP HEMIARTHRO	N/A	N/A	N/A	11:05	12:45	N/A	N/A	Warfarin	N/A	Y	N/A	N/A	Y
3940	AORTIC VALVE REPLACEMENT, POSS CAB	7:07	Vanco	Y	8:39	12:15	8/20/07, 22:04	N/A	N/A	132, 186	N/A	Y	Y	N/A
2612	MODIFIED RADICAL HYST.	13:10	Clinda		13:45	16:05	none ordered post-op	N/A	N/A	N/A	Y	Y	Y	N/A
4405	LEFT UNIPOLAR HIP HEMIARTHRO	18:43	Cefazolin		19:20	21:15	8/22/07, 12:15	N/A	Lovenox	N/A	Y	Y	Y	N/A
2646	TAH/BSO	10:45	Cefazolin		11:13	13:30	none ordered post-op	N/A	N/A	N/A	Y	Y	Y	N/A
3936	MITRAL VALVE REPAIR	8:00	Cefazolin	y	8:39	12:53	8/23/07, 03:00	N/A	N/A	122, 123	N/A	Y	Y	N/A
4965	LEFT COLECTOMY AND LEFT PARTIAL HEP	7:52	Cefoxitin		8:05	12:00	8/23/07, 11:44	100.2	Heparin	N/A	Y	Y	Y	Y
3933-2	CABG, MVR	14:53	Cefazolin	Y	15:00	19:30	8/23/07 1300	N/A	N/A	94, 101	N/A	Y	Y	N/A
3949	CABG	15:10	Clinda	Y	15:23	19:49	8/23/07, 07:00	N/A	N/A	137, 134	N/A	Y	Y	N/A
3945	RES. OF ASCENDING AORTIC ANEURYSM	11:50	Vanco	Y	13:24	17:04	8/23/07, 22:00	N/A	N/A	82,	N/A	Y		N/A
4947	ABD PERINEAL RESECTION	13:10	Cefoxitin		13:49	16:40		99	Heparin	N/A	Y	Y		Y
2644	TAH	13:25	Cefazolin		13:58	17:25		N/A	N/A	N/A	Y	Y		N/A
4954	RIGHT TKA	9:02	Cefazolin		9:29	11:34		N/A	N/A	N/A	Y	Y		N/A
	TVH													

Source: NorthShore University Health System, 2009.

Electronic flow sheets were created for each key process to standardize care and document compliance with standards, ensuring the right information is evaluated and the care plan is accessible (Exhibit 3). For example, one flow sheet guides nurses through a set of preoperative questions pertaining to beta blocker use; another coaches them through smoking assessment and education. Providing further value, these flow charts incorporate the precise wording of required documentation, reducing the need to reprocess records before their submission to CMS. Most of these improvements make use of automated prompts that are switched off only when documentation requirements are met.

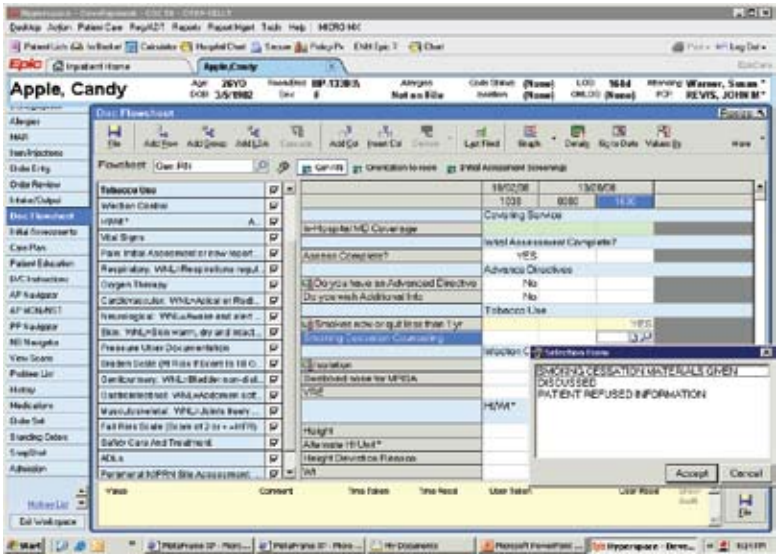
The EHR also provides decision support to doctors by alerting them when orders are missed or the wrong choice is made. Hospital administrators are aware that sending too many alerts might desensitize

Exhibit 2. Vaccine Navigator



Source: NorthShore University Health System, 2009.

Exhibit 3. Flow Sheet for Discharge Planning



Source: NorthShore University Health System, 2009.

doctors to them, a condition known as "alert fatigue." Thus, there is only one alert related to the core measures—on vaccine prescribing—currently in use. Other alerts are related to drug interactions, drug allergies, and duplicate orders.

Continuity of Care and Discharge Planning

NorthShore has had success in meeting the discharge care standards, though hospital leaders acknowledge that there is further work to be done to address patients' comprehensive needs. To date, the greatest improvement has come from assigning case managers to each nursing unit. During daily rounds, a case manager identifies patients whose care falls under the new guidelines to ensure all elements of their care are met, focusing particularly on discharge instructions and follow-up appointments. Patients receive detailed discharge instructions outlining the next steps in their care. Since this process has been in place, compliance with an important measure—percentage of heart attack patients given beta blockers at discharge—has risen to 100 percent. Administrators believe patients and families are more aware of how their care will continue outside the hospital. However, according to Kharasch, just because a patient has a follow-up plan does not mean he or she can, or will, follow it. More needs to be done to educate patients and facilitate appropriate follow-up care, in order to reduce potentially avoidable readmissions. Recently, NorthShore has begun redesigning its discharge process. According to the hospital's baseline report on readmission rates from CMS, its starting point is about equal to the national average.

RESULTS

NorthShore made rapid improvement on core measure scores, achieving exemplary performance in 2007 and early 2008 (Exhibit 4).

Exhibits 5, 6, and 7 illustrate the path NorthShore has taken to achieve these high scores. For each set of measures, NorthShore's performance far exceeds the national average and is similar to their preferred benchmark, created by the Association of American Medical Colleges.

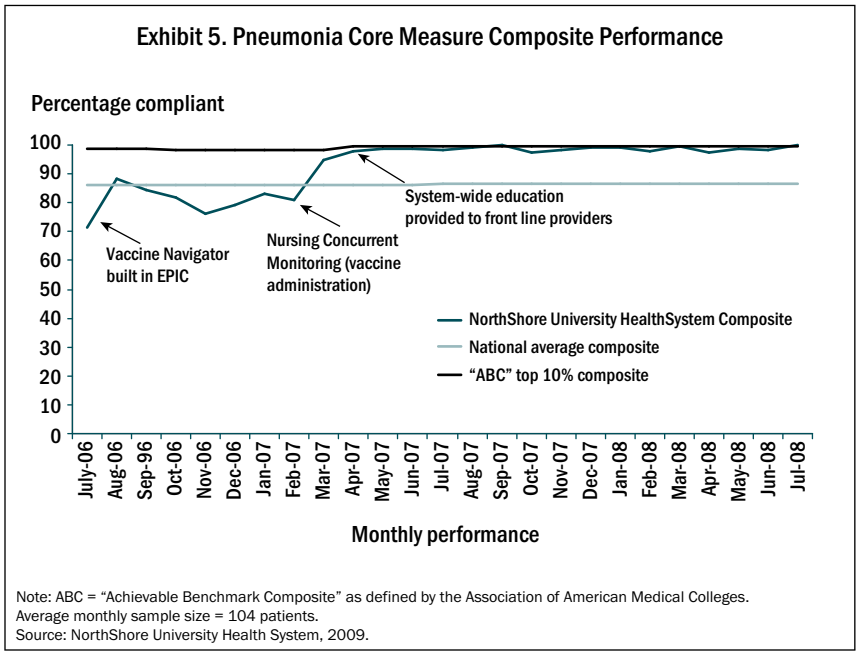
In Exhibit 5, the percentage of patients whose care was consistent with the pneumonia core measures is displayed. Starting out at just 72 percent in July 2006, compliance averaged 99 percent in the first six months of 2008. NorthShore leaders credit this substantial improvement to the introduction of the Vaccine Navigator, nurses' active participation in concurrent monitoring of patient care, and system-wide education.

Heart attack care was closer to achieving high performance when measurement began in 2006 (Exhibit 6). At the start of the measurement period,

Exhibit 4. NorthShore's Scores on CMS Core Measures Compared with State and National Averages

Indicator	National Average	Illinois Average	NorthShore
Heart Failure			
Percent of heart failure patients given discharge instructions	71%	77%	97% of 586 patients
Percent of heart failure patients given an evaluation of left ventricular systolic (LVS) function	87	92	100% of 842 patients
Percent of heart failure patients given ACE inhibitor or ARB for LVS dysfunction	88	87	96% of 200 patients
Percent of heart failure patients given smoking cessation advice/counseling	90	92	99% of 72 patients
Pneumonia			
Percent of pneumonia patients given oxygenation assessment	99	99	100% of 744 patients
Percent of pneumonia assessment patients assessed and given pneumococcal vaccination	80	77	98% of 766 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	91	98% of 661 patients
Percent of pneumonia patients given smoking cessation advice/ counseling	87	88	100% of 93 patients
Percent of pneumonia patients given initial antibiotics within six hours after arrival	93	93	99% of 610 patients
Percent of pneumonia patients given the most appropriate initial antibiotic(s)	87	87	98% of 337 patients
Percent of pneumonia patients assessed and given influenza vaccination	79	76	98% of 470 patients
Heart Attack			
Percent of heart attack patients given aspirin at arrival	94	92	100% of 510 patients
Percent of heart attack patients given aspirin at discharge	91	90	100% of 504 patients
Percent of heart attack patients given ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD)	89	86	99% of 80 patients
Percent of heart attack patients given smoking cessation advice/counseling	93	90	99% of 81 patients
Percent of heart attack patients given beta blocker at discharge	92	93	100% of 513 patients
Percent of heart attack patients given fibrinolytic medication within 30 minutes of arrival	41	34	0% of 1 patient
Percent of heart attack patients given PCI within 90 minutes of arrival	70	67	83% of 64 patients
Surgical Care Improvement/Surgical Infection Prevention			
Percent of surgery patients who received preventative antibiotics one hour before incision	85	86	98% of 1777 patients
Percent of surgery patients who received the appropriate preventative antibiotics for their surgery	92	93	99% of 1787 patients
Percent of surgery patients whose preventative antibiotics are stopped within 24 hours after surgery	83	81	98% of 1729 patients
Percent of all heart surgery patients whose blood glucose is kept under good control in the days right after surgery	86	90	98% of 53 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	96	100% of 568 patients
Percent of surgery patients whose doctors ordered treatments to prevent blood clots (venous thromboembolism) after certain types of surgeries	82	84	99% of 1615 patients
Percent of patients who received treatment to prevent blood clots within 24 hours before or after selected surgeries	79	80	99% of 1615 patients

Note: At the time NorthShore was selected for inclusion in the study, 24 process-of-care measures were used as the criteria. Currently, the 25 measures shown here have become the standard, thus this table includes newer data. ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blockers; LVS = left ventricular systolic; PCI = percutaneous coronary intervention. Data are more recent than the data used in the selection criteria.
Source: www.hospitalcompare.hhs.gov. Data are from April 2007 to March 2008.



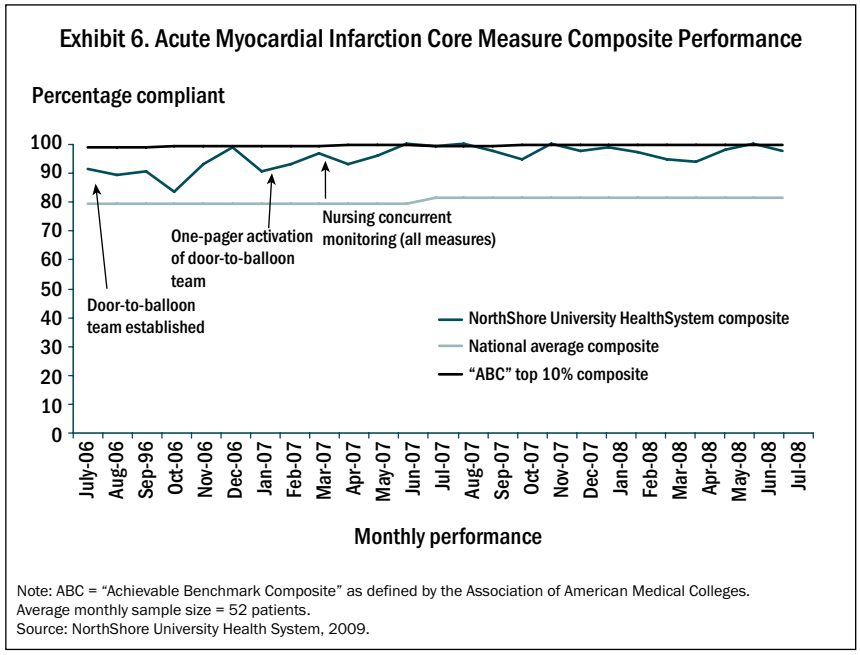
Note: ABC = "Achievable Benchmark Composite" as defined by the Association of American Medical Colleges.
Average monthly sample size = 104 patients.
Source: NorthShore University Health System, 2009.

about 91 percent of patients received care meeting all of the acute myocardial infarction (AMI) standards. After creating a process improvement team for reducing door-to-balloon time and a second team for one-pager activation of the care team, there was more variability but no real improvement. However, the introduction of concurrent monitoring of patient care coincided with an upward trend in achievement across all of the AMI measures. NorthShore recently joined a regional improvement program called Lifeline in an effort to further reduce its door-to-balloon time.

Exhibit 7, on heart failure care, illustrates a similar story of improvement with the introduction of concurrent monitoring, including having nurses counsel patients on smoking cessation and discuss discharge plans. Since NorthShore's system-wide educational initiative, care processes have largely met the standards.

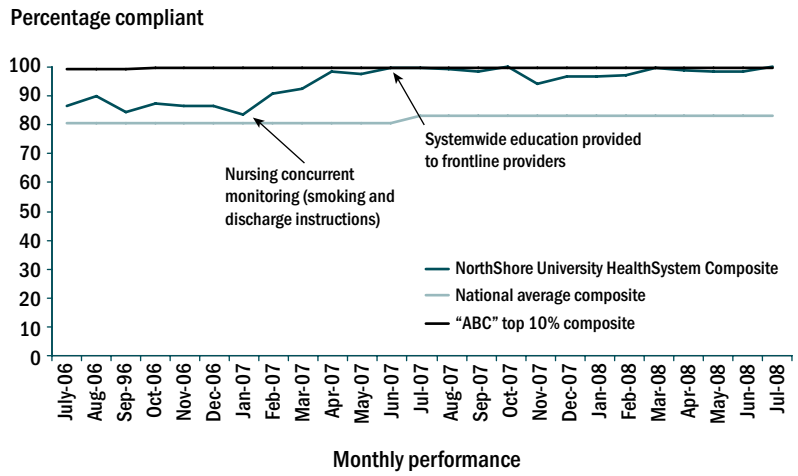
LESSONS LEARNED

Elements of NorthShore's quality improvement journey follow a pattern seen in other case studies in this series on high-performing hospitals in process-of-care



Note: ABC = "Achievable Benchmark Composite" as defined by the Association of American Medical Colleges.
Average monthly sample size = 52 patients.
Source: NorthShore University Health System, 2009.

Exhibit 7. Heart Failure Core Measure Composite Performance



Note: ABC = "Achievable Benchmark Composite" as defined by the Association of American Medical Colleges.
Average monthly sample size = 76 patients.
Source: NorthShore University Health System, 2009.

measures: quality education, involvement of multidisciplinary staff, process redesign, concurrent review and measurement, and improvement. As in other hospitals, day-to-day success is dependent on the diligence of the nursing department.

The improvement process helped to build bridges between the quality department and the clinical staff. Clinicians had not trusted the quality staff on issues related to compliance and documentation. But through physicians' direct communications with CMS about the core measures, sharing of concurrent data, and teamwork, their relationship improved and trust grew. Subsequently, physicians, nurses, and pharmacists took on leadership roles in achieving compliance with core measures. Now, improvements are driven not just by the quality department, but throughout the hospital by clinical and non-clinical staff.

NorthShore also learned that their staff were willing to use new systems, as long as they were accessible, actionable, and did not create additional burdens at the bedside. The EHR system made patients' information accessible and useful—facilitating delivery of care through prompts, flags, and other reminders for nurses, physicians, and pharmacists. Most important, giving clinicians real-time feedback about their patients has raised performance to a higher level.

FOR MORE INFORMATION

For more information about NorthShore University Health System's quality improvement strategies, contact: Liz Behrens, R.N., M.S.N., vice president of quality improvement, or Maureen Kharasch, R.N., M.S.N., director of quality and patient safety, NorthShore University Health System. Current core measure results are posted on the organization's Web site (www.northshore.org) in the Quality and Patient Safety Folder in the "About Us" section.

Notes

[1] This study was based on publicly available information and self-reported data provided by the case study institution. The aim of Fund-sponsored case studies of this type is to identify institutions that have achieved results indicating high performance in a particular area, 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 organizations' experiences in ways that may aid their own efforts to become high performers. 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.

[2] Quality data for Northshore University Healthcare is reported on WhyNottheBest.org and HospitalCompare under the former name of the institution, Evanston Northwestern Healthcare.

Appendix A. 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. We used 24 measures that are publicly available on the U.S. Department of Health and Human Services' Hospital Compare Web site, (www.hospitalcompare.hhs.gov). The 24 measures, developed by the Hospital Quality Alliance, relate to practices in four clinical areas: heart attack, heart failure, pneumonia, and surgical improvement.

Heart Attack Process-of-Care Measures

1. Percent of heart attack patients given ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD)
2. Percent of heart attack patients given aspirin at arrival
3. Percent of heart attack patients given aspirin at discharge
4. Percent of heart attack patients given beta blocker at arrival
5. Percent of heart attack patients given beta blocker at discharge
6. Percent of heart attack patients given fibrinolytic medication within 30 minutes of arrival
7. Percent of heart attack patients given PCI within 90 minutes of arrival
8. Percent of heart attack patients given smoking cessation advice/counseling

Heart Failure Process-of-Care Measures

9. Percent of heart failure patients given ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD)
10. Percent of heart failure patients given an evaluation of left ventricular systolic (LVS) function
11. Percent of heart failure patients given discharge instructions
12. Percent of heart failure patients given smoking cessation advice/counseling

Pneumonia Process-of-Care Measures

13. Percent of pneumonia patients assessed and given influenza vaccination
14. Percent of pneumonia patients assessed and given pneumococcal vaccination
15. Percent of pneumonia patients given initial antibiotic(s) within 4 hours after arrival
16. Percent of pneumonia patients given oxygenation assessment
17. Percent of pneumonia patients given smoking cessation advice/counseling
18. Percent of pneumonia patients given the most appropriate initial antibiotic(s)
19. 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

20. Percent of surgery patients who received preventative antibiotic(s) one hour before incision
21. Percent of surgery patients who received the appropriate preventative antibiotic(s) for their surgery
22. Percent of surgery patients whose preventative antibiotic(s) are stopped within 24 hours after surgery
23. Percent of surgery patients whose doctors ordered treatments to prevent blood clots (venous thromboembolism) for certain types of surgeries
24. 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 all four quarters in 2007. To be included, a hospital must have submitted data for all 24 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 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).

While high score on a composite of process-of-care measures was 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

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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