



Case Study

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North Mississippi Medical Center: Improving Efficiency Through Hospital, System, and Community-Wide Practices

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Vital Signs

Hospital: North Mississippi Medical Center

System: North Mississippi Health Services

Location: Tupelo, Mississippi

Type: Private, nonprofit hospital

Beds: 650

Distinction: Selected as one of 13 Highest Value Hospitals by the Leapfrog Group in 2008, based on efficiency scores taking into account the quality of care as well as resource utilization, among nearly 1,300 hospitals reviewed. Received a top efficiency score for three of four conditions/procedures examined (coronary artery bypass graft, percutaneous coronary interventions, and pneumonia care). See [Appendix A](#) for full methodology.

Timeframe: Hospital data from 2007

This case study describes the strategies and factors that appear to contribute to high efficiency at North Mississippi Medical Center. It is based on information obtained from interviews with key hospital personnel, publicly available information, and materials provided by the hospital in early 2010.



SUMMARY

North Mississippi Medical Center (NMMC) in Tupelo, Mississippi, was designated a Highest Value Hospital in 2008 for achieving a top efficiency score (reflecting both the quality of care and resource use) from the Leapfrog Group for coronary artery bypass graft, percutaneous coronary interventions, and pneumonia care. Leaders at NMMC believe that by focusing on serving patients, empowering staff, and improving health care quality, lower costs and growth will naturally follow. This philosophy is continuously reinforced through NMMC's close monitoring of its performance on quality measures, adoption of clinical

care guidelines identified by a Best Practices Committee, and investment in professional development. NMMC's management practices emphasize for both clinical and financial managers the goal of improving patient outcomes while reducing waste and costs. In particular, NMMC's success in providing efficient care can be attributed to the following:

- An electronic medical record and other centralized data systems that enable community providers to access patients' medical histories; link health outcomes with data on utilization, costs, and length of stay; and help promote patient flow.
- Through a service line management structure, each department is treated as a business unit responsible for the quality of patient care, patient satisfaction, staff productivity, and financial performance.
- NMMC looks beyond traditional cost drivers (e.g., people, equipment, and supplies) to focus on issues that have the greatest impact on cost: variation in care practices, complications, and socioeconomic and community health issues.
- The hospital is part of an integrated health system that promotes an emphasis on episodes of care, rather than hospital admissions. The system also works to keep people healthy through community-based programs and education.
- NMMC closely monitors data on patients' length of stay, as well as labor costs and productivity, to identify elements that contribute to higher costs. It also standardizes clinical practices and purchasing and uses innovative supply chain management techniques.
- The hospital has increasingly relied on hospitalists, who are viewed as key to enhancing quality and efficiency.
- Discharge planning begins within 24 hours of admission to ensure patients are ready for discharge. Follow-up calls to heart failure patients help to avoid complications that can lead to readmissions.

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Efficiency Case Study Series

Eager to foster higher value in the health care system, providers and payers have worked to promote more rigorous adherence to quality standards and reduced resource use, particularly when utilization can be demonstrated to be of little or no value to the patient.

This case study is part of a series that highlights best practices among hospitals that have excelled at meeting these efficiency criteria. We used the Leapfrog Group's Highest Value Hospital recognition program to identify eligible hospitals. For more information on how hospitals in the series were selected, see [Appendix A](#).

NMMC has had many of these practices in place for 20 or more years, providing a sound basis on which to continue to innovate. But its experience provides lessons to improve efficiency even for hospitals without a comparable history. These include:

- hospital leaders must be “relentlessly consistent” in focusing on their priorities;
- in developing health information technology, it is critical to consult with end-users in order to save time and money over the long term;
- data systems that enable hospitals to track utilization, costs, and quality are essential, but not sufficient—improvement also requires good communication, relationships, and trust among administrators, physicians, and staff;
- supply management can bring significant efficiencies through standardization, having the right inventory on hand, paperless ordering, and other strategies; and
- a hospital is just one component in a care system; to achieve real efficiency, leaders must focus on the health of the whole community.

Exhibit 1. North Mississippi Health Services, FY 2010

Inpatient admissions	32,474
Emergency department visits	129,396
Outpatient visits	333,240
Surgeries	24,214
Skilled nursing facilities (patient days)	99,718
Home health visits	299,024
Clinic encounters	609,438

Source: NMHS, Inc., Consolidated Statements of Operations, 2010.

INTERNAL AND EXTERNAL ENVIRONMENT

The Hospital

North Mississippi Community Hospital opened in Tupelo, Mississippi, in 1937 with a grant from The Commonwealth Fund and local contributions. At the time, The Commonwealth Fund was helping build rural hospitals designed to serve all patients, regardless of their ability to pay.

The nonprofit community hospital became North Mississippi Medical Center and expanded over the years to meet growing demand and serve a larger area. With 650 beds, NMMC is now the largest private hospital in Mississippi and the largest rural hospital in the United States.

In addition to its main, tertiary care facility, NMMC includes a Women's Hospital (in a separate building but operating under the same license), a behavioral health center (delivering both inpatient and outpatient services), a wellness center/day spa, seven home care offices, and an outpatient surgery clinic that is part of a joint venture.

Starting in 2004, NMMC applied for the Malcolm Baldrige National Quality Award, a prestigious award that recognizes exemplary performance in seven categories: leadership; strategic planning; customer and market focus; measurement, analysis, and knowledge management; human resource focus; process management; and business results. The process of applying for the award, and ultimately winning it in 2006, proved transformational: the exacting specifica-

tions forced NMMC to look carefully at itself and make improvements along the way. Leaders have set a new goal for the entire North Mississippi Health Services system to qualify for the award.

The System

NMMC is the flagship hospital of the North Mississippi Health Services (NMHS) system, a regional, integrated health care network that also includes five smaller community hospitals, 34 primary and specialty care clinics, seven home health agencies, and four nursing homes. NMHS serves a 24-county area that encompasses northern Mississippi and part of northwestern Alabama. In 2009, NMHS facilities experienced nearly 33,000 inpatient hospital admissions and nearly 335,000 outpatient visits (Exhibit 1).

The Environment

NMMC has little competition in the Tupelo area, but in the broader region there are university hospitals in Birmingham, Alabama, and Jackson, Mississippi, as well as smaller community hospitals. The lack of competition in the Tupelo region appears to contribute to the hospital's high performance. Since administrators cannot easily replace physicians and staff, and employees are not able to move to another local hospital, both parties appear to be committed to working through problems as long-term partners. Low turnover rates among nurses and physicians improve efficiency by reducing the time and cost of training new hires in the hospital's practices and culture.

Overall, Mississippi faces many health care challenges, with most measures of the state's health system performance landing in the bottom quartile across the nation, according to The Commonwealth Fund's 2009 State Scorecard.¹ NMHS is involved in community efforts to try to address some of the state's public health problems and health system deficiencies.

ORGANIZATIONAL/CULTURAL FACTORS THAT MAY CONTRIBUTE TO EFFICIENCY

North Mississippi Medical Center has been working for decades to improve health care quality and value. Its current efforts build on past work to create information systems, design an effective management strategy, and cultivate the staff and clinician competencies needed to achieve high performance. This section emphasizes the organizational and cultural factors that contribute to efficiency at NMMC.²

Integrated Care Delivery

NMMC's integration with primary and specialty clinics, long-term care services, and its five sister community hospitals brings efficiencies and appears to promote quality. In particular, it promotes communication between hospital personnel and those involved with patients before and after hospitalization. NMMC's electronic medical record (EMR) system, described below, is shared across all NMHS sites, as well as with school clinics and some nonaffiliated physician offices

that pay to participate, creating a virtual regional health information organization.³

Several clinical protocols cross inpatient/outpatient lines within the health system, thus improving the coordination and consistency of care. For example, there are shared clinical protocols for management of heart failure, pain, diabetes, and other conditions.

The health system's standardized purchasing of supplies and equipment (described below) and its ability to spread fixed costs create economies of scale and savings. Finally, participation in the system seems to minimize competition among the provider groups, promoting a common goal of improving the health of the local population.

Mission and Values

North Mississippi Health Services aims "to continuously improve the health of the people of the region," a mission it pursues through what it terms critical success factors: people, service, quality, finances, and growth. These priorities are ingrained in NMMC's culture: they are used to organize meetings and other activities and incorporated into the performance standards in physicians' contracts.

One NMMC leader summarized the administration's attitude as, "if you take care of the staff, physicians, and patients, the finances will take care of themselves."

The health system focuses on episodes of care, rather than on hospital admissions. It emphasizes keeping people well rather than treating illness—reaching into the community rather than treating only those who come for care. For example, it seeks to reduce high obesity rates in the region by changing the behavior of children, who may then influence their parents. NMHS partnered with the Health Care Foundation of North Mississippi and Memorial Health System to develop HealthWorks!, an interactive, educational center that opened in February 2009 where school children learn about nutrition, exercise, and good health habits.

¹ Performance measures include indicators of access, prevention, and treatment; avoidable hospital use and costs; equity; and healthy lives. See The Commonwealth Fund's [2009 State Scorecard on Health System Performance](#).

² For additional background on NMMC's journey, see: J. B. Barber et al., "Evolution of an Integrated Health System: A Life Cycle Framework," *Journal of Healthcare Management*, July/August 1998 (43)4; S. H. Beckham et al., "Clinical Applications of Computer-Based Health Information," *Topics in Health Information Management*, 1998 (18)3; J. Englert et al., "Using Clinical Practice Analysis to Improve Care," *Journal on Quality Improvement*, 2001 (27)6; and J. Murphree et al., "North Mississippi Medical Center: A Focus on Quality, Safety, and Financial Critical Success Factors," *Journal on Quality and Patient Safety*, 2005 (31)10.

³ A regional health information organization brings together health care stakeholders within a defined geographic area and governs health information exchange among them for the purpose of improving health and health care.

Management Tools

NMMC divides its work into five service lines: cardiovascular; emergency and surgery; medicine; oncology and behavioral health; and women and children. Adapted from other industries, service line management brings decision-making and accountability to frontline clinicians. Each service line is treated as a business unit responsible for the quality of patient care, patient satisfaction, staff productivity, and financial performance.

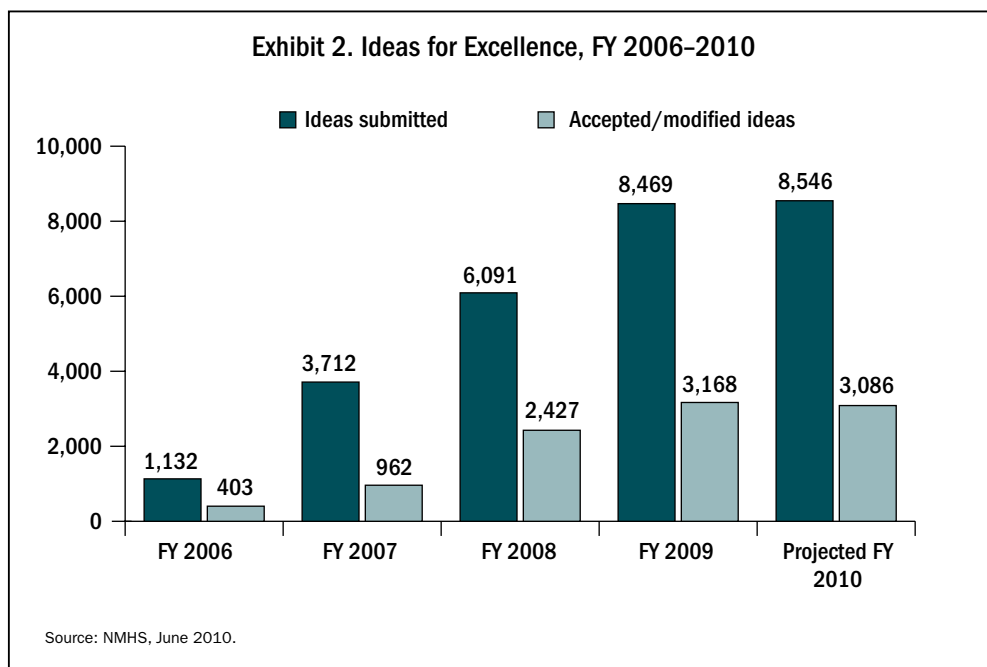
In 1992, NMMC began using care-based cost management, an approach that links health care quality with costs in order to promote efficiency. Managers look beyond traditional cost drivers such as staff, equipment, and supplies to focus on factors that have the greatest impact on costs: variation in care practices, complications, and issues such as obesity and other community health concerns. This approach aligns clinicians’ incentives to improve health outcomes with financial managers’ efforts to reduce waste and costs. Care-based cost management has evolved at NMMC from a physician-centered process to one in which care teams are brought together to address a problem, perhaps by creating a new clinical protocol or standardizing supplies. The multidisciplinary teams include frontline nurses and physicians as well as the

administrative and/or support staff most closely involved in the issue at hand.

“Ideas for Excellence” is another management tool that NMMC uses to support continuous improvement among frontline staff. Every year, each employee is asked to identify two improvement ideas. The ideas are then reviewed by the person who can approve, modify, or reject them. In recent years, more than a third of the suggestions have been accepted (Exhibit 2). Employees whose ideas are approved receive reward points, which can be redeemed for gifts. In addition, the hospital invests in professional development; staff members receive an average of more than 65 hours of continuing education each year.

NMMC also undertakes an annual planning process to promote performance improvement. The ideas and concerns of stakeholders are gathered from surveys and an environmental assessment. In addition, each department identifies its own performance measures and goals for the year, which are rolled up to the level of service line and hospital-wide performance improvement priorities.

Labor management is critical to achieving efficiency at NMMC. The finance department closely monitors labor costs, which comprise 50 percent of controllable costs, and productivity, measured as the



The goal is to help “steer physicians toward efficiency by using surrogate measures, using their language, and breaking it down into pieces they understand and can manage.”

Mark Williams, M.D.,
chief medical officer at NMHS

number of full-time equivalents (FTEs) per occupied bed. Leaders compare productivity in each department to projections on a biweekly basis. If deviations occur, the department is required to develop an action plan. Further, a staff vacancy triggers an assessment of the need for the position, which may result in a decision to ask the department to function more efficiently without replacing the staff member.

Administrators monitor data on length of stay (LOS) and engage with physicians whose patients tend to have long stays. The goal is to help “steer physicians toward efficiency by using surrogate measures, using their language, and breaking it down into pieces they understand and can manage,” said Mark Williams, M.D., chief medical officer at NMHS. “At other hospitals, administrators might tell doctors what DRG [diagnosis-related group] is losing money, but this is not very helpful or relevant to them. It’s more meaningful to discuss with [the doctors] their LOS and what contributes to the higher costs. Break it down to drug choices, procedure scheduling, and treatment pathways and doctors will then begin to see what they can influence. If you don’t tell them *why* something costs more, they won’t know what to do.”

The economic downturn has added extra pressures on NMMC to maximize efficiencies. The number of uninsured patients treated by the hospital has risen in the past year, as has the number of charity write-offs. To address this, chief financial officers are pursuing three strategies: ensuring appropriate clinical documentation so that reimbursement accurately reflects patient acuity; pushing labor and management productivity; and adjusting prices for certain procedures, depending on volume and payment mechanisms.

STRATEGIES THAT IMPROVE EFFICIENCY

Health Information Technology

North Mississippi Health Services was an early leader in the use of health information technology (HIT), developing its core system nearly 30 years ago and building components that either fully integrate or interface with it ever since. The HIT system is complex but well-integrated. “Senior management has always understood the value of HIT, and invested wisely,” said Tommy Bozeman, the health system’s chief information officer.

From the earliest stages, NMHS has asked frontline nurses, physicians, and administrative staff what technological tools they need. This, according to Bozeman, results in systems that staff members accept and use. The health system has hired clinicians to work on HIT; of an IT staff of about 150 across the health system, some 35 to 40 are registered nurses who bridge the knowledge of programmers and clinicians to promote acceptance and use of HIT.

NMHS’ centralized electronic medical record (EMR) is used in all of its inpatient and outpatient locations. Access to medical records is available to school nurses in 22 schools (with parental permission) and to non-NMHS medical practices that contract to be part of the system (with patients’ permission).

While NMHS has not conducted a formal evaluation of its EMR, leaders believe that it and other HIT systems result in efficiencies as well as better clinical care. The shared EMR facilitates communication among hospital personnel and community primary care physicians and specialists, NMHS home care service providers, and nursing homes. This promotes prompt sharing of medical histories, test results, and referrals and reduces duplication of procedures, resulting in lower costs and smoother patient transitions to and from the hospital. NMMC staff also believe the EMR reduces errors related to miscommunication. The EMR is available at the bedside, giving nurses and physicians access to clinical information while treating their patients.

During the discharge planning process, NMMC case managers use electronic tablets that interface with

discharge checklists, resources, and guidelines so that care planning is both thorough and efficient.

NMHS's HIT system also facilitates quality improvement. For the past 15 years, it has linked data on health outcomes with data on utilization, costs, and length of stay, including at the individual physician level. Variances and outliers trigger review, with a consulting firm providing the health system with benchmarking data. NMHS is currently in the process of upgrading its EMR system, which is expected to facilitate more detailed analysis of quality and cost management and enable member hospitals to meet the definition of "meaningful use" of HIT under federal guidelines.

HIT is used to manage patient flow and coordinate care in the NMMC's emergency department and intensive care unit. Information about patients' current status, needs, and test results is readily accessible, and the system prompts managers when immediate follow-up is needed. This means that both patients and providers experience less down time, and critical information, for example about patients' allergies, is less likely to be overlooked. NMMC has a transfer center that uses an electronic "bed board" to help triage patients to the right location before they are admitted (described further below). These electronic tools help avoid delays, reduce the number of patient transfers and "handoffs," and get patients to the most appropriate care setting efficiently. HIT also plays a critical role in the health system's materials management, described below.

Benchmarking and Goal-Setting

Like many hospitals, NMMC compares its performance against internal and external benchmarks to determine whether opportunities exist to improve quality or reduce resource utilization. The quality department compares internal performance data with data from Premier's highest-performing hospitals and the top 10 percent of hospitals identified by the Joint Commission. The hospital's accounting system does not yet enable such cost comparisons, though work is under way to build this capacity. Instead, the hospital identifies and analyzes the strategies of low-cost hospital outside of its system.

Using this information, administrators identify providers who are outliers in terms of health care quality, length of stay, and other aspects of efficiency and reach out to them to discuss opportunities to improve. While this method is often effective, administrators are considering incorporating financial incentives to encourage certain kinds of clinical improvements (e.g., reducing the number of days surgery patients are on ventilators after their operations).

Best Practices Committee

Staff at NMMC have been using clinical care guidelines for many years. Recently, the hospital formed a Best Practices Committee, including the CEO, chief medical officer, nurse leadership, service line administrators, and 10 physician representatives from all specialties, to develop guidelines for further aspects of care delivery. The group meets quarterly, assigning teams to focus on specific issues and then reviewing their work. The goal is to identify best practices for: getting the right patients into the hospital; making appropriate handoffs; ensuring orders are placed quickly; and reducing avoidable admissions, hospital days, and readmissions.

The committee and its teams glean best practices from sources such as the Agency for Healthcare Research and Quality, the Veterans Health Administration Forum, Dartmouth Atlas, and QUEST and compare the hospital's performance to regional, state, and national benchmarks to help physicians understand the "why" behind cost and quality outliers. When a new clinical protocol is adopted, it is refined by physicians and nurses and then implemented by service line administrators, who note that it can be challenging to keep up with the new care standards. Although there are no financial incentives for physicians to participate, many volunteer their time on protocol development teams. Doing so helps them understand the contexts regarding variations in practice and the need for care standards.

Managing the Supply Chain

NMMC's view of standardization as the key to high quality and efficiency extends beyond clinical practice

to its purchasing practices. Standardization enables the hospital to purchase supplies in bulk, resulting in fewer suppliers and fewer expensive last-minute deliveries. It requires careful product selection and convincing physicians—particularly surgeons, who may be accustomed to getting their own preferred supplies—that a standardized set of supplies performs as well or better than custom orders. To do this, NMMC holds a trial period for every supply it orders, watches the outcomes, and elicits feedback from users. When clinicians are convinced of the effectiveness of a particular supply, the medical review committee makes it the standard. In addition to saving money, standardization also simplifies training on supplies and equipment and reduces practice variation across clinicians.

The health system achieves significant efficiencies through supply chain management. The vice president of supply chain management has studied and applied lessons from inventory and distribution systems in multiple industries and across continents. For example, the warehouse, which services the entire health system, stores supplies in plastic totes and containers instead of cardboard and wood, which can attract insects and damage the floor. Supplies are carefully organized to reduce mistakes in selecting them. In 2007, NMHS opened a new, state-of-the-art warehouse that has brought additional efficiencies and savings through electronic ordering, laser ring readers, and wire-guided forklifts that free operators from steering while driving a load of goods down an aisle.⁴ The redesigned warehouse was able to dispense greater number of supplies from 2007 to 2010, while reducing the number of mispicked items.

While the dollar value of NMHS' inventory on hand has gone up, the amount it spends on ordering supplies through distributors has declined, mainly through buying directly from the manufacturer and purchasing in larger quantities. This has reduced NMHS costs by approximately \$3 million per year.

⁴ Order pickers wear a wrist computer with a laser ring reader, a device that directs the picker through the warehouse in the most efficient route to each item's location. Scanning the barcode confirms that the correct item is being picked. See <http://nmhs.net/media/documents/10052007.pdf>.

NMHS is also building an off-site Central Sterile Processing center, which will use innovative design and robotics to advance the field of instrument sterilization to improve efficiency as well as patient safety.

Strategic Staff Deployment

Changes in patient census and case mix can make it difficult for hospitals to provide the appropriate number and mix of staff for each shift. NMMC pursues several strategies to best match staffing levels and experience to the evolving needs of patients. It cross-trains within service lines, so that staff know how to care for each others' patients. In addition, administrators try to keep staff in familiar environments and among colleagues, to promote their job satisfaction as well as patients' satisfaction and safety. For example, nurses who work frequently with cardiology patients will be more knowledgeable about their care protocols, common medications, and discharge education.

NMMC's computerized staffing system enables staff to schedule additional shifts from their home computers. This enables timely updates to work schedules to respond to shifts in patient population and minimizes the need to use higher-cost temporary workers, who may not perform or communicate as well as the regular staff.

Timing certain procedures to make best use of staff capacity also promotes efficiency. For example, orthopedic cases are scheduled on Mondays and Tuesdays to be able to discharge patients by Friday and avoid unnecessary weekend stays.

NMMC administrators consider the use of hospitalists to be their most important initiative. Currently, eight salaried, full-time hospitalists manage 50 percent to 60 percent of the inpatients; administrators hope they will manage 90 percent of inpatients within two years. Clinical leaders work with the hospitalists to achieve consistency in adherence to protocols, medication regimens, early-morning discharges, and communication. Leaders say that training this one group is easier than trying to change the behavior of hundreds of community physicians who spend a small amount of time in the hospital and are less familiar with its standardized processes.

“Hospitalists are much more efficient and better for the patient than having four or five different physicians consulting with no one in charge,” said Williams. Leaders say that community physicians prefer to spend less time in hospitals, so using hospitalists is a win-win situation. The EMR system enables hospitalists to send patients’ information to community physicians. The hospital is also working to build relationships between each community physician and a specific NMMC hospitalist, to promote trust and more effective and efficient communication.

NMMC’s Stroke Unit illustrates how the hospital deploys staff and equipment, including health information technology, to promote quality and efficiency. Instead of working from a central nurse station, specially trained nurses sit at desks overlapping two stroke patients’ rooms. Each nurse has a computer with the full electronic medical record and other resources. Rooms have X-ray capacity, and the images are available via computer for the nurses’ review. An intensivist (a hospitalist who specializes in intensive care) is on the unit from 7 a.m. to 11 p.m. There are consultation rooms in which families and physicians can talk privately.

NMMC has invested in staff development to reduce or avoid shortages that can impinge on quality, revenue, or efficiency. To address a deficit of primary care providers in the region, NMMC started a family

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chief medical officer at NMHS

medicine residency program about 15 years ago. About 80 percent of the residents trained at NMMC stay in Mississippi, and many retain their affiliation with the hospital. NMMC is also a rotation site for internal medicine from the University of Mississippi Medical School, and the hospital is looking into establishing a residency in internal medicine as well as a hospital medicine fellowship program. In addition, NMMC has funded faculty and training slots in nursing schools to address nursing shortages.

Managing Patient Flow

NMMC’s Transfer Center, which opened in 2006, is designed to place patients quickly and appropriately in a bed where their needs can be met. When referring physicians call to request an admission for one of their patients, the Transfer Center nurse asks questions to understand the needs, reviews bed availability, and arranges for a bed (Exhibit 3). When patients reach the hospital, they can generally be admitted directly to the

Exhibit 3. NMMC Transfer Center Bed Board



unit best suited for their care, rather than face delays, spend time on a unit with a different clinical focus, or have to go through the emergency department. This is likely to contribute to safer and more effective care.

The emergency department has also been restructured to enhance efficiency, including the following changes:

- bedside triage and assessment, resulting in faster time to treatment;
- a computer in every room, enabling clinicians to see prior records, order tests, and review results;
- ability to view and take X-rays in every room; and
- computerized tracking system in the nurses' station and patient rooms, showing patient flow, status, procedures, and other information.

These and other improvements have helped reduce the average amount of time patients spend in the emergency department from four and one-half to six hours, down to just two and three-quarters hours. The hospital aims to achieve an average of two hours.

Planning for Discharge to Reduce Avoidable Readmissions

Nurse case managers conduct a needs assessment of every patient within 24 hours of admission to begin planning for discharge, rather than waiting on a floor nurse or physician to refer the patient for discharge planning. This proactive approach helps ensure that all patients are ready for discharge, when it is appropriate. Additional staff members, including social workers, are brought in to collaborate on complex cases.

Data on readmissions for heart failure patients led staff to examine their discharge process for this group of patients. Through patient interviewing, NMMC found that heart failure patients needed reeducation the day after discharge since many did not recall the instructions given to them when they left the hospital. On a trial basis, an NMMC nurse began calling heart failure patients 24 hours after their discharge, then again a week later, and sometimes more often to discuss medications, diet, weight changes, and warn-

ing signs. After this protocol was implemented, the hospital reports that it saw readmissions among heart failure patients decline by three percentage points. NMMC nurses now regularly make these post-discharge calls, and may extend them to other types of patients.

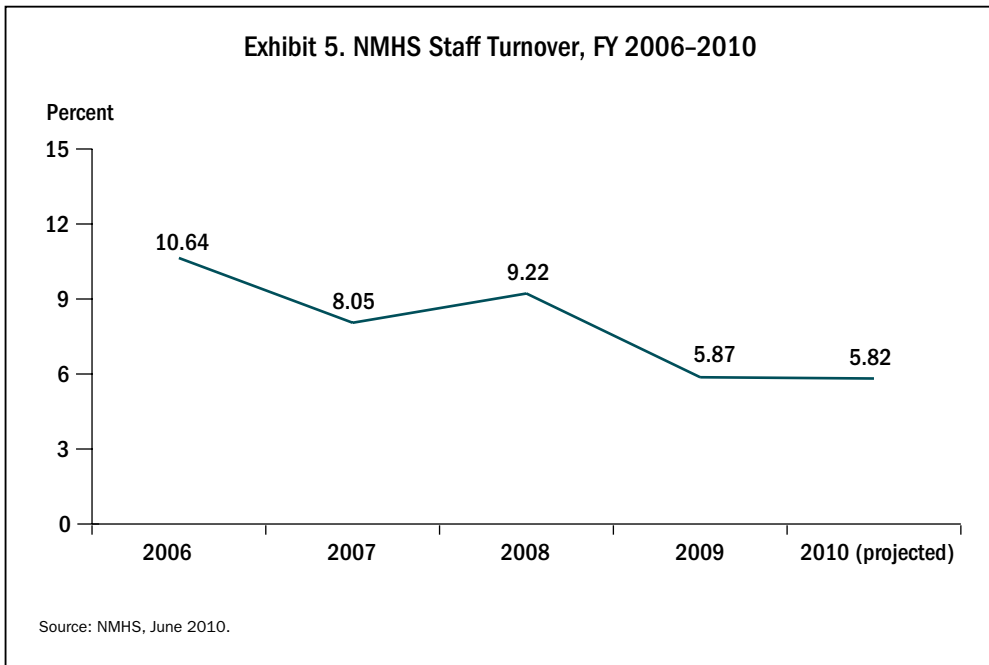
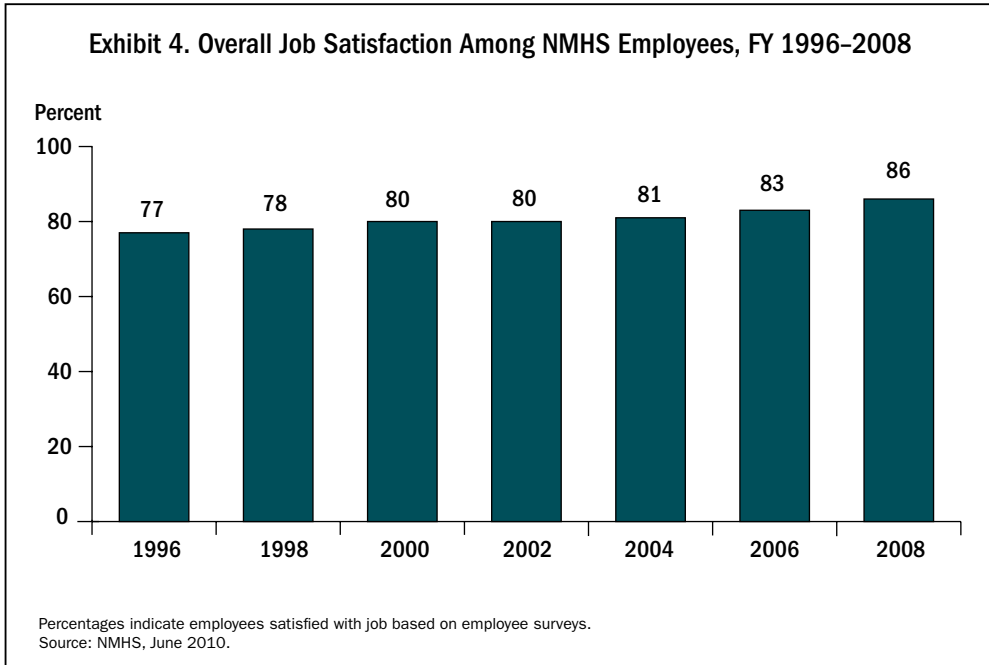
NMMC still faces some discharge challenges. For example, hospital staff realize they need to do a better job of reconciling patients' medications prior to discharge. According to the most recent data from the Hospital Consumer Assessment of Healthcare Providers and Systems, only 65 percent of patients said that NMMC staff always explained their medications to them. The hospital has created a team to make progress in this area.

RESULTS

The Leapfrog Group's designation of NMMC in 2008 as one of 13 Highest Value Hospitals among nearly 1,300 that voluntarily submitted surveys reflects the hospital's efficient use of resources and high quality of care for a subset of patients ([Appendix A](#)).

[Appendix B](#) shows that NMMC performs well above the national average on most process-of-care and patient experience measures submitted to the Centers for Medicare and Medicaid Services, though it sometimes scores only among the top 10 percent of hospitals.

As discussed above, NMMC's lack of local competition, combined with managers' emphasis on ensuring staff and physician satisfaction throughout the health system, have resulted in low turnover rates, which in turn promote efficiencies in terms of recruiting and training and may also improve the quality of care and patient safety ([Exhibits 4 and 5](#)).



LESSONS

A number of lessons emerge from North Mississippi Medical Center’s experience that may help other hospitals seeking to enhance efficiency and value.

Hospital leaders must be “relentlessly consistent” in pursuing their priorities.

NMMC’s success seems to be tied to its consistent emphasis on people in terms of service to patients and families, high-quality care, and ensuring staff satisfaction and retention. Leaders also follow the mantra that “the lowest cost is doing things correctly up front.” These priorities are reinforced through the hospital’s organizational structure, staffing deployment, quality improvement processes, and other practices described in this case study. The NMMC president, Steve Altmiller, recently introduced an approach to improvement involving: design a system, simplify it, build in checks and balances, then review the system for how quickly staff identify and “swarm” around problems.

The process of applying for the Malcolm Baldrige National Quality Award helped NMMC develop the rigorous systems and improvement methods needed to succeed. Other hospitals could use the Baldrige criteria and processes as a way to pursue improvements in their own institutions.

Eliciting users’ input about health information technology is critical and less costly in the long term.

Using standard, centralized information technology systems—as opposed to having departmental “fiefdoms” with separate IT budgets and purchasing—has contributed to NMMC’s relatively low-cost but well-integrated electronic medical record and data systems. It proved critical for the hospital to develop the original system, and to select and customize the new system, with user input. Hospitals are well served by devoting time up front to define their IT needs, develop detailed requests for proposals, and select vendors that fit their particular system and culture.

Relationships and culture give credibility to the data, by building trust and partnerships among clinicians and administrators.

Karen Koch, NMMC director of quality

Change is not possible without having performance data, but it also requires trusting relationships among administrators, managers, and staff.

While data play a central role in clinical and administrative processes and decision making at NMMC, according to Karen Koch, director of quality, “relationships and culture give credibility to the data, by building trust and partnerships among clinicians and administrators.” Administrators have effectively recruited physicians as partners in standardizing care. The hospital’s emphasis on employee satisfaction and staff development has also engendered trust and reduced turnover—leading to greater productivity, quality, and efficiency by reducing the time and costs of training and building experienced teams of clinicians.

The use of hospitalists improves quality and efficiency.

NMMC’s leaders agree that hospitalists improve quality and efficiency in multiple ways. Having these full-time staff physicians reduces the number of handoffs between clinicians and the associated risks of errors. In addition, it is easier for the hospital to introduce new protocols and procedures among a handful of hospitalists than among hundreds of community physicians. NMMC is trying a new approach, pairing community physicians with particular hospitalists, to enhance communication between both parties.

Supply management can bring significant efficiencies.

In the United States, health care supply management practices lag behind those in other countries and industries. NMHS has adopted best practices from Europe, including standardization of supplies and equipment, which has led to more efficient purchasing and warehousing. Hospitals should expect some resis-

tance to standardization, trial any new supply, and offer in-service education and training on its use.

Hospitals are just one part of a care system.

NMMC's experience suggests that health system integration plays a major role in achieving efficiencies. Being part of a system provides greater potential to enhance communication across providers, achieve economies of scale, smooth patient transitions across settings, and care for the whole patient across an episode of care.

NMHS and other integrated systems may have the foundation on which to test new models of financing care that offer incentives to keep patients healthy, for example through bundled payments or shared savings in accountable care organizations.

FOR FURTHER INFORMATION

For further information about NMMC's quality improvement initiatives, contact: Karen Koch, director of quality, North Mississippi Medical Center, kkoch@nmhs.net.

Appendix A. Selection Methodology

The selection of hospitals for inclusion in the case study series on efficiency is based on their designation by the Leapfrog Group as a “Highest Value Hospital.” To be eligible for this recognition, a hospital must have completed and submitted a Leapfrog Hospital Survey to the Leapfrog Group during the 2008 survey cycle.* During this cycle, 1,282 hospitals voluntarily submitted surveys, with a majority participating at the request of local employers and/or regional business coalitions.

Leapfrog’s efficiency scoring methodology takes into consideration both resource use and quality of care for a subset of all hospital patients: those undergoing a coronary artery bypass graft (CABG) or a percutaneous coronary intervention (PCI), or being treated for an acute myocardial infarction (AMI) or pneumonia. The resource use measure for a procedure or condition is a comparison of a hospital’s actual length of stay compared with their risk-adjusted expected length of stay, further adjusted for readmission. If a patient is readmitted for any reason within 14 days of discharge, the resource utilization is considered higher. The quality measures for CABG and PCI are based on a hospital’s case volume; their risk-adjusted mortality rates as reported by national or regional registries or public state reports; and adherence to nationally endorsed process-of-care measures. The quality measures for AMI and pneumonia are those voluntarily reported by hospitals to the Centers for Medicare and Medicaid Services (CMS), known as the core measures. A hospital whose relevant patients have higher-quality care, a shorter than expected length of stay, and are without a readmission within 14 days for any reason are scored as highly efficient.

Leapfrog’s detailed scoring algorithms are available at: http://www.leapfroggroup.org/media/file/Leapfrog_Resource_Utilization_Risk-Adjustment_Model_White_Paper.pdf.

For a hospital to be deemed “Highest Value,” it needed to be in the top performance category for efficiency for at least three of the four procedures and conditions.

The Leapfrog methodology has some limitations. It does not take into account the care provided to patients with other conditions, nor does it examine resource use other than length of stay (adjusted for readmissions). Further, participation is voluntary on the part of hospitals. Therefore, hospitals included in this case study series may not be representative of all hospitals considered efficient using other metrics. However, the Leapfrog Group’s resource use measure has been endorsed by the National Quality Forum and appears to be the only national source for efficiency data.

While designation as a “Highest Value Hospital” by the Leapfrog Group 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 United States on a composite of Health Quality Alliance process-of-care (core) measures as reported to CMS; full accreditation by the Joint Commission; not an outlier in heart attack and/or heart failure mortality rates; and no major recent violations or sanctions.

Since 2009, the Leapfrog Group has been using a different efficiency measurement to designate “Top Hospitals,” rather than “Highest Value Hospitals.” The main difference is that the new methodology looks at measures of efficiency at the hospital level, rather than at the condition level. Details can be found at the Leapfrog Group Web site, <http://www.leapfroggroup.org/media/file/2010LHRPScoringMethodology.pdf>.

The Commonwealth Fund’s [WhyNotTheBest.org](http://www.whynotthebest.org) Web site does not post these Leapfrog data, though it does include some indicators of efficiency such as readmission rates.

* Leapfrog had not yet completed its analysis of 2009 survey data when we began our hospital selection process.

**Appendix B. Performance Data from WhyNotTheBest.org for North Mississippi Medical Center,
CY 2009**

	Top 10% of U.S. Hospitals	National Average	North Mississippi Medical Center
Overall Recommended Care	98.42%	95.65%	97.55%
Overall Heart Attack Care	99.89%	97.50%	98.91%
Aspirin on arrival	100%	98.32%	99.01%
Patients given aspirin at discharge	100%	98.06%	99.06%
ACEI or ARB for LVSD	100%	96.02%	99.32%
Adult smoking cessation advice/counseling	100%	99.52%	100%
Beta blocker prescribed at discharge	100%	98.09%	99%
Fibrinolytic therapy received within 30 minutes of hospital arrival	85.37%	76.02%	N/A
Primary PCI received within 90 minutes of hospital arrival	100%	90.67%	89.29%
Legacy: Beta blocker on arrival	N/A	89%	98.10%
Overall Pneumonia Care	98.37%	93%	97.13%
Pneumococcal vaccination	100%	91.91%	97.92%
Blood cultures performed in the emergency department prior to initial antibiotic received in hospital	100%	95.26%	94.98%
Adult smoking cessation advice/counseling	100%	97.9%	98.82%
Pneumonia patients given initial antibiotic(s) within 6 hours after arrival	100%	95.12%	97.86%
Initial antibiotic selection for community-acquired pneumonia (CAP) in immunocompetent patients	98.08%	91.38%	94.95%
Influenza vaccination	100%	90.53%	98.09%
Legacy: Pneumonia patients given initial antibiotic(s) within 4 hours after arrival	N/A	81%	77.03%
Legacy: Pneumonia patients given oxygenation assessment	N/A	99%	100%
Overall Heart Failure Care	99.29%	92.34%	97.24%
Discharge instructions	100%	87.53%	94.06%
Evaluation of LVS function	100%	95.99%	100%
ACEI or ARB for LVSD	100%	94.55%	95.96%
Adult smoking cessation advice/counseling	100%	99.07%	100%

	Top 10% of U.S. Hospitals	National Average	North Mississippi Medical Center
Overall Surgical Care	98.58%	95.08%	97.38%
Pre-surgical antibiotic given at the right time	100%	95.83%	97.99%
Surgical patients who were given the right kind of antibiotic	100%	96.80%	97.99%
Preventive antibiotics stopped at right time	98.96%	93.73%	94%
Cardiac surgery patients with controlled 6 a.m. postoperative blood glucose	98.78%	92.99%	96.01%
Surgery patients with appropriate hair removal	100%	99.22%	100%
Surgery patients with recommended venous thromboembolism prophylaxis ordered	99.26%	93.01%	92.14%
Surgery patients who received appropriate venous thromboembolism prophylaxis within 24 hours prior to surgery to 24 hours after surgery	98.91%	91.39%	92.01%
Surgery patients on a beta blocker prior to arrival who received a beta blocker during the perioperative period	100%	92.47%	100%
Patient Experience (HCAHPS) - Rating 9 or 10			
Percent of patients highly satisfied	78%	67.16%	77%
Doctors always communicated well	87%	80.18%	86%
Nurses always communicated well	83%	75.82%	84%
Patients always received help as soon as they wanted	76%	63.92%	71%
Staff always explained about medicines	68%	60.30%	65%
Pain was always well controlled	76%	69.23%	76%
Patient's room always kept quiet at night	71%	57.98%	71%
Patient's room and bathroom always kept clean	82%	71.13%	77%
Patients given information about recovery at home	88%	81.78%	83%
Patients would definitely recommend this hospital to friends and family	82%	69.31%	81%
Readmission			
Hospital 30-day readmission rates for heart attack	16.50%	18.34%	17.80%
Hospital 30-day readmission rates for heart failure	22.40%	24.73%	22.70%
Hospital 30-day readmission rates for pneumonia	18.40%	19.97%	20.90%
Mortality			
Heart attack 30-day mortality rate	14.10%	16.17%	16.40%
Heart failure 30-day mortality rate	9.40%	11.28%	14.80%
Pneumonia 30-day mortality rate	9.50%	11.68%	13.20%

Note: ACEI = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blockers; LVSD = left ventricular systolic dysfunction.

Source: Why Not the Best? <http://www.whynotthebest.org>, accessed June 29, 2011.

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