



Case Study

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Luther Midelfort Mayo Health System: Laying Tracks for Success

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Vital Signs

Location: Eau Claire, Wis.

Type: Nonprofit, physician-led integrated health system, including three rural critical access hospitals (nonteaching) and 220-physician multi-specialty clinic with 12 outpatient locations

Beds: 305

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



SUMMARY

Exemplary quality scores at Luther Midelfort Mayo Health System in Eau Claire, Wis., are the result of a long-term commitment to building quality and safety into systems of care. Since joining the Mayo Health System in 1992, Luther Midelfort has advanced a culture that supports staff in their efforts to test new ideas and improve care. Although work focused on Centers for Medicare and Medicaid Services (CMS) core measures began recently, the newer efforts follow the philosophy and strategy established years earlier. In a recent analysis by The Commonwealth Fund, Luther Midelfort achieved the third-highest score in the country on a composite of 22 process-of-care measures that all hospitals report to CMS.

The key components of Luther Midelfort’s quality strategy are:

- exposing clinical leaders to the concepts of quality improvement, then giving them time to work with teams to apply their knowledge;
- creating expert, interdisciplinary teams for each clinical area to determine the right content of care and then turning over the implementation to a team with expertise in designing workflow and care processes; and
- rapid measurement and feedback, supported by a quality resources department that coaches teams through improvement cycles.

ORGANIZATION

Luther Midelfort Mayo Health System is a physician-led, integrated health system serving west central Wisconsin. Luther Hospital was founded in 1905 by a group of Norwegian clergymen. It grew over time to have 305 beds and provide a full range of services, including comprehensive cardiac, trauma, and maternity care. The system includes three rural critical access hospitals. Midelfort Clinic is a 220-physician multi-specialty clinic with 12 outpatient locations. The combined Boards of Directors include seven elected physicians, five community members, three physicians from Mayo Clinic Rochester, and one Mayo Health System administrator. The Boards of Directors set the mission and vision of the organization, determine policy, and direct the management to implement policy.

The objective of Luther Midelfort’s work on the core measures is to provide the right care 100 percent of the time. According to Terrance Borman, M.D., the medical director, following the care processes is “not rocket science.” Still, delivering recommended care for every patient requires constant attention. Luther Midelfort’s strategy is to “lay a track for all trains to run down”—getting the processes right so that care is delivered according to plan. Borman and his colleagues involve the staff members who will implement the care processes in their design. If a certain process does not provide the desired outcome, they keep working at it until they have made it reliable.

STRATEGIES FOR SUCCESS

Luther Midelfort does not use exotic tools or unusual clinical strategies. It follows the plan-do-check-act (PDCA) approach, providing rapid feedback of quality indicators to frontline staff and benchmarking their performance against other hospitals in the system. What may make Luther Midelfort successful is the culture of experimentation and learning that underlies its work.

Learning from the Quality Leaders

According to Borman, a driving force behind Luther Midelfort’s success is its longstanding relationship with the Institute for Healthcare Improvement and other thought leaders in the field, including the Juran Institute and Everett Rogers. Hospital leaders have participated in training and improvement activities for the past 15 years and have learned the best techniques in system improvement. “Quality and safety are properties of well-designed systems,” says Borman. “So if the outcome is not what’s needed, we look first to redesign systems.”

Everett Rogers, in his book *Diffusion of Innovations*, advised that creating slack would spur new thinking. Luther Midelfort recognizes that improvement is work and staff need dedicated time to do it. Thus, staff members are given time apart from their daily responsibilities to test new ideas. Some physicians spend 10 to 30 percent of their time on safety or quality improvement activities. Borman believes this allowance of time, paired with the techniques of process redesign, quick cycle improvement, and benchmarking, contribute to the hospital’s success.

Staff need time away from their everyday work to test new ideas and innovate, according to hospital leadership.

Specialized Teams

Many hospitals use teams to study, redesign, and monitor quality improvement efforts. Luther Midelfort recognized that staff members who have a particular clinical expertise are not always closest to the delivery of

patient care. Therefore, each quality improvement effort is supported by two teams. The first team defines the clinical standard—what should be done for each patient presenting with a particular condition. The team is typically led by a physician and includes physicians, nurses, pharmacists, and others with expertise in a particular clinical area. These teams report to one of the assistant medical directors. Appendix B illustrates the care processes for pneumonia treatment developed by the pneumonia team.

The standard of care developed by the clinical team is then handed off to a Hospital Implementation Team (HIT), which has experience in process redesign and can determine the best way to translate that standard into a highly reliable system. The HIT serves the entire hospital and focuses on how work is being done and any impediments to achieving the best outcome each time. It charts progress on a weekly basis and continues tweaking care processes until the process of care is carried out consistently in the manner expected. It may consult with the expert team at various stages of the project.

The HIT has members from all care delivery sites, so that implementation strategies are tailored to local needs, rather than a “one-size-fits-all” solution. Once the new processes are implemented, the Hospital Improvement Team signs off on the project. The expert team takes back responsibility for longer-term monitoring of results and quality control. Appendix C is a tracking sheet for the pneumonia care process, illustrating how measures and process are connected throughout the patient’s stay.

Teams specialize: either they have clinical expertise or process redesign expertise. Both types of teams are needed.

Another role of the HIT is to coordinate the multiple improvement efforts that occur on a hospital unit. Making sure the efforts are staged, coordinated, and streamlined can prevent staff overload and burn-out. In this role, the team becomes a critical link in communication up and down the organization and among staff members.

Rapid Measurement and Feedback

The third strategy Luther Midelfort has found to be critical to its success is rapid measurement of quality indicators and timely feedback to frontline staff and the implementation team. Early in a project, process measures are collected weekly, even if only for a small number of patients. Once the care processes repeatedly produce the right results, monitoring becomes biweekly. Regular feedback help keeps priority areas in the minds of staff. Subsequently, local data are joined with reports from across all Mayo sites to inspire competition, which Borman believes has promoted better performance.

Luther Midelfort’s Quality Resources Department offers resources including advice on quality improvement techniques such as PDCA cycles and manual data checking systems. The Quality Resources Department also uses case managers to monitor achievement of standards in real time. If they discover a deficiency, they can alert medical leadership, who can contact a physician while a patient is still in the hospital and address it.

Soon, Luther Midelfort hopes to leverage its new electronic medical record system to support reporting on core measures.

RESULTS

Despite the fact that Luther Midelfort has a strong foundation in quality improvement, Borman says it took one to two years to find the right way to improve care in the four clinical areas assessed through the core measures (heart attack, heart failure, pneumonia, and surgical infections). Once the hospital worked out its care processes, it achieved outstanding results. Each of the 22 measures is close to 100 percent reliable, and has been for most of the past two years ([Table](#), page 5).

During a recent month, there was a dip in one measure. Borman explored the potential causes with the clinical expert committee. The care processes were so well defined that it took little time to discover that one group was confused about the timing of the first antibiotic administration for pneumonia patients. A clarification was communicated to staff and performance levels on this measure bounced back.

Physician buy-in has been extremely high, which Borman attributes to the fact that the core measures are not that controversial. In addition, the care processes are so well designed that they leave little room for argument. For example, order sheets are designed so that the right way to provide the care is also the easiest way to order it.

LESSONS LEARNED

Above all, Borman says Luther Midelfort has learned to focus on the process. “You can’t achieve better results just by encouragement,” he says. The hospital’s strategy of putting together the right workgroups to “lay the tracks for all trains to run down” has been key to its success.

Luther Midelfort also believes in giving people the tools they need to improve. They have mostly encouraged use of the PDCA approach to quality improvement. They have also turned to Six Sigma and Lean methodology when appropriate.

Physician champions have been extremely helpful in bringing attention to this work. Their commitment, paired with accountability that extends up to the Boards of Directors, leaves no room for doubt among staff about the hospital’s priorities. To keep resources focused on improvement, Luther Midelfort engages in strategic planning every 180 days to identify what will be done in the next six months. It collects data and monitors progress. Since CMS instituted them, core measures have been a focus of improvement and therefore at the forefront of the organization’s plans and resources.

FOR MORE INFORMATION

For more information about Luther Midelfort’s quality improvement strategies, contact: Terrance Borman, M.D., medical director, Luther Midelfort, or borman.terrance@mayo.edu or (818) 907-4540.

Also see www.luthermidelfort.org.

Table. Luther Midelfort's Scores on 22 CMS Core Measures Compared with State and National Averages

Indicator	National Average	Minnesota Average	Luther Midelfort Hospital
Heart Failure			
Percent of heart failure patients given discharge instructions	69%	77%	92% of 163
Percent of heart failure patients given an evaluation of LVS function	87	89	99% of 213
Percent of heart failure patients given ACE inhibitor or ARB for LVS dysfunction	87	89	96% of 55
Percent of heart failure patients given smoking cessation advice/counseling	89	89	100% of 15
Pneumonia			
Percent of pneumonia patients given oxygenation assessment	99	100	100% of 191
Percent of pneumonia assessment patients assessed and given pneumococcal vaccination	78	84	98% of 198
Percent of pneumonia patients whose initial emergency room blood culture was performed prior to the administration of the first hospital dose of antibiotics	90	94	95% of 133
Percent of pneumonia patients given smoking cessation advice/ counseling	85	87	98% of 57
Percent of pneumonia patients given initial antibiotics within six hours after arrival	93	97	98% of 101
Percent of pneumonia patients given the most appropriate initial antibiotic(s)	87	90	94% of 104
Percent of pneumonia patients assessed and given influenza vaccination	75	75	96% of 56
Heart Attack			
Percent of heart attack patients given aspirin at arrival	94	97	99% of 118
Percent of heart attack patients given aspirin at discharge	91	95	100% of 241
Percent of heart attack patients given ACE inhibitor or ARB for LVS dysfunction	88	88	96% of 52
Percent of heart attack patients given smoking cessation advice/counseling	92	90	100% of 77
Percent of heart attack patients given beta blocker at discharge	92	94	99% of 264
Percent of heart attack patients given beta blocker at arrival	89	90	99% of 94
Percent of heart attack patients given fibrinolytic medication within 30 minutes of arrival	40	45	no patients met inclusion criteria
Percent of heart attack patients given PCI within 90 minutes of arrival	67	81	74% of 23
Surgical Care Improvement/Surgical Infection Prevention			
Percent of surgery patients who received preventive antibiotics one hour before incision	84	90	97% of 911
Percent of surgery patients who received the appropriate preventive antibiotics for their surgery	91	95	100% of 924
Percent of surgery patients whose preventive antibiotics are stopped within 24 hours after surgery	82	88	98% of 813
Percent of surgery patients whose doctors ordered treatments to prevent blood clots (venous thromboembolism) for certain types of surgeries	80	87	94% of 891
Percent of surgery patients who received treatment to prevent blood clots within 24 hours before or after selected surgeries	77	84	91% of 891

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

Source: www.hospitalcompare.hhs.gov. Accessed on 10/24/08. Data are from CY2007.

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 (CMS). We use 22 measures that are publicly available on the U.S. Department of Health and Human Services' Web site, Hospital Compare (www.hospitalcompare.hhs.gov). The 22 measures, developed by the Hospital Quality Alliance (HQA), relate to practices in four clinical areas: heart attack, heart failure, pneumonia, and surgical infections.

Heart Attack Process-of-Care Measures

Percent of Heart Attack Patients Given ACE Inhibitor or ARB for Left Ventricular Systolic Dysfunction (LVSD)
 Percent of Heart Attack Patients Given Aspirin at Arrival
 Percent of Heart Attack Patients Given Aspirin at Discharge
 Percent of Heart Attack Patients Given Beta Blocker at Arrival
 Percent of Heart Attack Patients Given Beta Blocker at Discharge
 Percent of Heart Attack Patients Given Fibrinolytic Medication Within 30 Minutes of Arrival
 Percent of Heart Attack Patients Given PCI Within 90 Minutes of Arrival
 Percent of Heart Attack Patients Given Smoking Cessation Advice/Counseling

Heart Failure Process-of-Care Measures

Percent of Heart Failure Patients Given ACE Inhibitor or ARB for Left Ventricular Systolic Dysfunction (LVSD)
 Percent of Heart Failure Patients Given an Evaluation of Left Ventricular Systolic (LVS) Function
 Percent of Heart Failure Patients Given Discharge Instructions
 Percent of Heart Failure Patients Given Smoking Cessation Advice/Counseling

Pneumonia Process of Care Measures

Percent of Pneumonia Patients Assessed and Given Influenza Vaccination
 Percent of Pneumonia Patients Assessed and Given Pneumococcal Vaccination
 Percent of Pneumonia Patients Given Initial Antibiotic(s) Within 4 Hours After Arrival
 Percent of Pneumonia Patients Given Oxygenation Assessment
 Percent of Pneumonia Patients Given Smoking Cessation Advice/Counseling
 Percent of Pneumonia Patients Given the Most Appropriate Initial Antibiotic(s)
 Percent of Pneumonia Patients Whose Initial Emergency Room Blood Culture Was Performed Prior to the Administration of the First Hospital Dose of Antibiotics

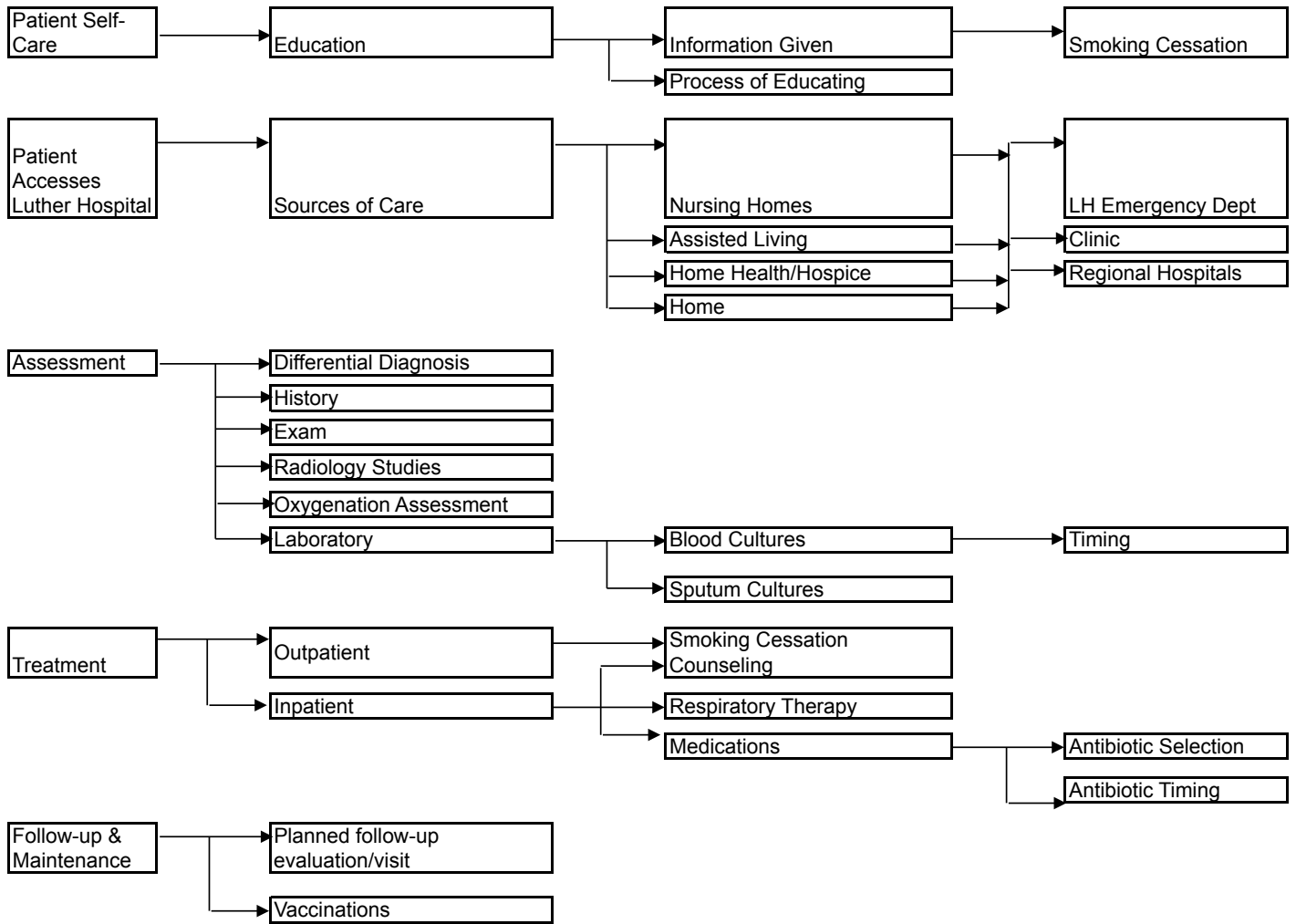
Surgical Care Improvement/Surgical Infection Prevention Process-of-Care Measures

Percent of Surgery Patients Who Received Preventative Antibiotic(s) One Hour Before Incision
 Percent of Surgery Patients Who Received the Appropriate Preventative Antibiotic(s) for Their Surgery
 Percent of Surgery Patients Whose Preventative Antibiotic(s) Are Stopped Within 24 hours After Surgery

The analysis uses all-payer data from the second quarter of 2006 through the first quarter 2007. To be included, a hospital must have submitted data for all 22 measures (even if data submitted were based on zero cases), with a minimum of 30 cases for at least one measure in each of the four clinical areas. Approximately 80 percent of U.S. acute care hospitals submitted data on the 22 measures. Approximately 2,000 facilities—about half of acute care hospitals—were eligible for the analysis.

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

APPENDIX B. LUTHER MIDELFORT’S CARE PROCESSES FOR PNEUMONIA PATIENTS



Source: Luther Midelfort Hospital 2008.

APPENDIX C. INPATIENT PNEUMONIA PROCESS AND MEASURES - EXAMPLE

	Key	Target	Measure	In Control	Acceptable Performance	Notes/Remarks
Patient Presents	P1	100%	Oxygenation Assessment	Y	Y	100%
	P2	90th percentile	Blood Culture Performed	Y	Y	100% (CCU/NICU pts)
	P3	90th percentile	Blood Culture Prior to First Antibiotic Dose	N (+)	Y	96% (ED pts)
Assess Patient	P4	90th percentile	Initial Antibiotic Selection for Immunocompetent Patients (ICU & NonICU)	Y	Y	100%
	P5	90th percentile	Initial Antibiotic Selection for Immunocompetent Patients (ICU)	Y	Y	100%
	P6	90th percentile	Initial Antibiotic Selection for Immunocompetent Patients (NonICU)	Y	Y	100%
Placed on Pneumonia Standing Orders	P7	90th percentile	Antibiotic Timing (Mean)	Y	?	107.2 median
	P8	90th percentile	First Antibiotic Dose Within 8 Hours of Hospital Arrival	Y	Y	100%
	P9	90th percentile	First Antibiotic Dose Within 4 Hours of Hospital Arrival	N (+)	Y	96%
Treat Patient	P10	90th percentile	Tobacco Cessation Advice/Counseling	N (+)	Y	100%
	P11	90th percentile	Pneumococcal Screening and/or Vaccination	N (+)	N	94.5% Decision to remove afebrile criteria from order set
	P12	90th percentile	Influenza Screening and/or Vaccination	N (+)	N	93% (quarter ending Feb 2006) Decision to remove afebrile criteria from order set
Audit Chart	P13		All-or-None	N (+)	N	90%
	P14		No protocol on chart (ED)	N (+)	N	5.50%
	P15		No protocol on chart (NonED)	new measure	N	28.60%
Discharge Patient	P1					
	P13					
	P1					

At each point (P1 through P13) in the process of care flow diagram, there is an opportunity to measure compliance with the care plan. In addition, charts originating in the emergency department (ED) or not in the ED, are reviewed for the presence or absence of the protocol document (measures P14 and P15).

Source: Luther Midelfort Hospital 2008.

ABOUT THE AUTHOR

Jennifer 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 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.

