

# Measuring and Improving the Quality of Care in Rural Minnesota Hospitals

Michelle M. Casey

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Beginning with a brief overview of national health care quality improvement efforts, this article describes national initiatives to improve the quality of care and patient safety, along with the challenges of measuring quality of care in rural settings. Next, the article analyzes the performance of rural Minnesota hospitals in the Hospital Compare and Leapfrog initiatives and compares the results of national and Minnesota surveys regarding medication safety practices in small rural hospitals. The article concludes by suggesting ways rural Minnesota hospitals can continue to improve quality of care.

## What is “Quality of Care”?

Quality health care is defined by the Agency for Healthcare Quality and Research as doing the right thing, at the right time, in the right way, for the right person — and having the best possible results. This means that patients receive the appropriate services they need to help them stay healthy and recover from illness and do not receive unnecessary tests or procedures.

There are many different ways to measure health care quality. Traditionally, three types of measures have been used to evaluate the quality of health care: structure, process and outcome. *Structural measures* address the characteristics of health care providers and facilities that are expected to influence the quality of care provided, such as the qualifications of medical staff and whether a hospital is accredited. *Process measures* focus on the type of care that is provided and how it is provided: for example, whether a child receives a recommended immunization on schedule or a patient with diabetes receives an annual eye exam. *Outcome measures* address the impact of care on the patient. Examples may include whether a patient survives or recovers the ability to take care of himself or herself.

Data to assess quality of care can come from a variety of sources, including patient medical records, Medicare and private insurer billing data, and patient surveys.

Increasingly, structural measures have been considered necessary but not a sufficient means of assuring health care quality. Although outcome measures are the most direct way of measuring quality, their use is complicated because factors other than the care provided can affect patient outcomes. Patient characteristics such as age, chronic health problems and other pre-existing conditions may all influence the effectiveness of the treatment and therefore the outcome. In addition, the outcomes of some types of preventive care cannot be measured until several years have passed. For these reasons, many of the most recent efforts to evaluate the quality of health care have focused on process measures. These measures are based on evidence in scientific literature regarding the relationships between specific treatments and patient outcomes, as well as expert opinion.

## National Quality Performance Measurement and Improvement Efforts

*Setting standards at the national level.* The Institute of Medicine's 2001 report, *Crossing the Quality Chasm*, defined quality health care as care that is effective, safe, timely, patient-centered, equitable and efficient, establishing priorities for improvement of the nation's health care system (IOM, 2001). A subsequent IOM report published in 2005, *Quality through Collaboration: The Future of Rural Health*, built on the previous IOM work to address quality of care issues in rural America. The IOM rural report recommended adoption of a comprehensive approach to quality improvement in rural areas that encompasses clinical knowledge and the tools to apply this knowledge to practice, standardized performance measures, performance measurement and data feedback, and quality improvement processes and resources (IOM, 2005).

Public and private sector health care organizations have implemented several national initiatives focused on performance measurement and quality improvement in recent years. These initiatives have multiple purposes. Within a health care organization, assessment of organizational performance can help inform and motivate internal activities to improve the quality of care. Sharing data on standardized quality measures allows health care organizations to benchmark with their peers, and public reporting of comparative information can be used to improve purchaser and

consumer decision making about where to get the best care.

Many organizations at the national level have implemented some type of quality of care measures:

- The Joint Commission on Accreditation of Health Care Organizations (JCAHO), the private non-profit organization that accredits the majority of hospitals, has incorporated quality measures in the accreditation process.
- The Hospital Quality Alliance (HQA) was established by a coalition of hospital associations and other private and public organizations to encourage voluntary public reporting of hospital quality information.
- The Center for Medicare and Medicaid Services (CMS), which administers the Medicare and Medicaid programs on the federal level, has implemented public reporting of quality measures for hospitals, nursing homes, and home health agencies and has begun a voluntary reporting effort focused on physicians.
- The National Quality Forum (NQF), a public-private partnership that includes purchasers, employers, health care professionals and other organizations, endorses national consensus standards for measuring and publicly reporting on performance.
- The Leapfrog Group, a purchaser coalition, helps its employer-members provide incentives and rewards to hospitals that improve the quality of the care provided to patients by implementing Leapfrog's quality and safety practices, which are known as "leaps."

To help minimize confusion and duplication of efforts and reduce the reporting burden on health care organizations, representatives of several national organizations have worked to standardize quality measures. HQA, JCAHO, and CMS have agreed on a set of hospital quality measures that reflect evidence-based treatment for heart attack (acute myocardial infarction), heart failure, pneumonia, and surgical infection prevention (CMS, 2005). These conditions are common reasons for hospitalization, especially among Medicare beneficiaries. The measures, endorsed by the National Quality Forum, are being used for multiple purposes, including accreditation and public reporting. NQF also has endorsed a set of 30 safe practices for implementation by hospitals. Leapfrog adopted three of these practices as its first three "leaps" and the remaining 27 practices as the fourth "leap."

## Measuring Quality of Health Care in Rural Environments

Although many issues related to improving health care quality are common to both urban and rural areas, a number of quality measurement issues are specific to rural health care systems. Rural hospitals tend to be smaller organizations with lower patient volume and to provide fewer specialized services than urban hospitals. They are also more likely to have limited resources available in terms of staffing and technology, and to transfer a higher percentage of patients with certain conditions (e.g., heart attacks) to larger facilities.

These organizational differences have implications for the relevance of quality measures for rural hospitals and measurement reliability (Moscovice, Wholey, Klingner et. al., 2004). Some quality measures developed for larger urban hospitals are not relevant for rural hospitals because, for example, they address procedures that are not usually performed in rural hospitals. At the same time, additional quality measures are needed to address processes that are especially important in rural hospitals, such as triage, stabilization and transfer of patients. Also, low patient volumes in many rural hospitals make it more difficult to obtain reliable rates for some quality measures, especially those focused on specific conditions or procedures.

**Hospital Compare reporting requirements.** To make quality measure data more accessible to the public, the Medicare Prescription Drug, Improvement and Modernization Act of 2003 required eligible acute care hospitals paid under the Prospective Payment System (PPS)<sup>1</sup> to report data to CMS on the initial ten quality measures adopted by the Hospital Quality Alliance, beginning with 2004 discharges.<sup>2</sup> Hospitals could also report data on additional measures if they chose. The data was then reported on Hospital Compare, a website set up by CMS to provide public access to the quality data. Hospitals that did not report the required data faced a reduction in their Medicare annual payment update, starting in fiscal year 2006. Subsequently, the Deficit Reduction Act of 2005 required PPS hospitals to report data on a total of 21 measures beginning in fiscal year 2007 and further reduced the payment update for hospitals that declined to provide data or failed the data submission requirements.

The CMS reporting requirement does not apply to Critical Access Hospitals (CAHs), which receive cost-based reimbursement from Medicare, rather than payments via the PPS system. As of October 2006, a total of 1,284 hospitals nationally were certified

as CAHs; Minnesota has the third highest number of CAHs in the nation (Flex Monitoring Team, 2006a). CAHs must be located in a rural area or an area defined as rural by federal Medicare regulations governing CAH designation and either located at a certain distance from another hospital or certified by the state as a necessary provider of health care services. They are limited to a maximum of 25 beds and must maintain an annual average length of stay of 96 hours or less for their acute care patients. Although participation in Hospital Compare is voluntary for CAHs, it provides an important opportunity for CAHs to assess and improve their performance on national standards of care, and many CAHs are voluntarily submitting data.

***Hospital Compare quality measures.*** Figure 1 lists the 21 quality measures currently in the Hospital Compare dataset, including the initial ten measures PPS hospitals were required to report to CMS for 2004 and 2005 discharges. The initial ten-measure set included five measures for heart attack patients: aspirin at arrival, aspirin at discharge, beta blocker at arrival, beta blocker at discharge and ACE inhibitors for left ventricular systolic dysfunction (LVSD). The ACE inhibitor measure was subsequently revised to include angiotensin receptor blockers (ARBs); both are medications used to treat heart attacks, heart failure, or a decreased function of the heart. Beta blockers are medications used to lower blood pressure, treat chest pain and heart failure, and to help prevent a heart attack.

Two measures for heart failure patients were in the initial set: assessment of left ventricular function (LVF), which checks how the left chamber of the heart is pumping, and prescription of ACE inhibitor (or later ARB) for LVSD. Small rural hospitals are much less likely to have the echocardiography or cardiac catheterization facilities needed to assess LVF. However, the measure counts a patient in the numerator if the hospital record documents that LVF was evaluated before arrival, during hospitalization, or is planned for after discharge. Three pneumonia measures were also in the initial measure set: oxygenation assessment, pneumococcal vaccination status, and whether the initial antibiotic was received within four hours.

The additional measures for which hospitals could voluntarily report data for 2004 and 2005 discharges include three measures related to the provision of smoking cessation advice for patients hospitalized for a heart attack, heart failure, or pneumonia, who had a history of smoking. Additional heart attack measures address the timing for provision of thrombolytic drugs used to break up

**Figure 1:** Hospital Compare measures for heart attack, heart failure, pneumonia and surgical infection prevention.

<b>Heart attack/acute myocardial infarction (AMI) Measures</b>
<b>Aspirin at arrival:</b> AMI patients without aspirin contraindications who received aspirin within 24 hours before or after hospital arrival.*
<b>Aspirin at discharge:</b> AMI patients without aspirin contraindications who were prescribed aspirin at hospital discharge.*
<b>ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD):</b> AMI patients with LVSD and without angiotensin converting enzyme inhibitor (ACE inhibitor) or angiotensin receptor blocker (ARB) contraindications who are prescribed an ACE inhibitor or an ARB at hospital discharge.*
<b>Beta Blocker at arrival:</b> AMI patients without beta-blocker contraindications who received a beta-blocker within 24 hours after hospital arrival.*
<b>Beta Blocker at discharge:</b> AMI patients without beta-blocker contraindications who were prescribed a beta-blocker at hospital discharge.*
<b>Thrombolytic agent received within 30 minutes of hospital arrival:</b> AMI patients receiving thrombolytic therapy during the hospital stay and having a time from hospital arrival to thrombolysis of 30 minutes or less.
<b>PCI received within 120 minutes of hospital arrival:</b> AMI patients receiving Percutaneous Coronary Intervention (PCI) during the hospital stay with a time from hospital arrival to PCI of 120 minutes or less (This measure was initially within 90 minutes).
<b>Smoking cessation advice/counseling:</b> AMI patients with a history of smoking cigarettes who are given smoking cessation advice or counseling during a hospital stay.
<b>Heart Failure Measures</b>
<b>Assessment of left ventricular function (LVF):</b> Heart failure patients with documentation in the hospital record that LVF was assessed before arrival, during hospitalization, or is planned for after discharge.*
<b>ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD):</b> Heart failure patients with LVSD and without ACE inhibitor or ARB contraindications who are prescribed an ACE inhibitor or an ARB at hospital discharge.*
<b>Discharge instructions:</b> Heart failure patients discharged home with written instructions or educational material given to patient or caregiver at discharge or during the hospital stay addressing activity level, diet, discharge medications, follow-up appointment, weight monitoring, and what to do if symptoms worsen.

<b>Smoking cessation advice/counseling:</b> Heart failure patients with a history of smoking cigarettes, who are given smoking cessation advice or counseling during a hospital stay.
<b><i>Pneumonia Measures</i></b>
<b>Initial Antibiotic Timing:</b> Pneumonia inpatients that receive within 4 hours after arrival at the hospital.*
<b>Pneumococcal Vaccination Status:</b> Pneumonia inpatients age 65 and older who were screened for pneumococcal vaccine status and were administered the vaccine prior to discharge, if indicated.*
<b>Oxygenation Assessment:</b> Pneumonia inpatients who receive an oxygenation assessment, arterial blood gas, or pulse oximetry within 24 hours of hospital arrival.*
<b>Blood culture performed prior to first antibiotic received in hospital:</b> Pneumonia patients whose initial hospital blood culture specimen was collected prior to first hospital dose of antibiotics.
<b>Smoking cessation advice/counseling:</b> Pneumonia patients with a history of smoking cigarettes, who are given smoking cessation advice or counseling during a hospital stay.
<b>Appropriate Initial Antibiotic Selection:</b> Immunocompetent patients with pneumonia who receive an initial antibiotic regimen that is consistent with current guidelines.
<b>Influenza Vaccination Status:</b> Pneumonia patients age 50 years and older, hospitalized during October through February who were screened for influenza vaccine status and vaccinated prior to discharge, if indicated.
<b><i>Surgical Infection Prevention Measures</i></b>
<b>Prophylactic Antibiotic Received Within 1 Hour Prior to Surgical Incision:</b> Surgical patients who received prophylactic antibiotics within 1 hour prior to surgical incision.
<b>Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time:</b> Surgical patients whose prophylactic antibiotics were discontinued within 24 hours after surgery end time.

\* Measures that were part of the initial 10 measure set for public reporting.  
Source: CMS, 2006.

or dissolve blood clots, and of percutaneous coronary intervention (PCI) procedures, which open blocked blood vessels. PCI procedures require specialized equipment and cardiology expertise that are not present in many rural hospitals. An additional heart failure measure assesses whether a patient or caregiver was given instructions at discharge or during the hospital stay that addressed activity

level, diet, discharge medications, follow-up appointment, weight monitoring, and what to do if symptoms worsen. Additional pneumonia measures assess whether a patient had a blood culture performed before the first antibiotic was received in the hospital, and the appropriateness of the initial antibiotic selection. Implementation of another pneumonia measure, influenza vaccination, was delayed due to vaccine shortages, but was added to the list of measures in 2006. The surgical infection prevention measures assess the provision and timing of antibiotics prior to surgery and their discontinuation after surgery. These measures apply to selected surgeries; some (e.g., hysterectomies) are more commonly provided in rural hospitals than others (e.g., cardiac procedures).

The goal for each Hospital Compare measure is to have 100% of eligible patients receive the treatment. The measures exclude patients who have contraindications to receiving the treatment. For example, aspirin would not be given to patients who are allergic to aspirin or are taking anticoagulant medication. Patients who are transferred to another hospital or transferred from another hospital also are not included in the population for several measures. To report the measures, hospitals collect data from patient medical records and submit it to the Quality Improvement Organization (QIO) Data Warehouse. Data submissions are subject to auditing procedures, edit checks and validation by CMS.

In 2003-2004, the University of Minnesota Rural Health Research Center evaluated the relevance of existing national and state quality measures for rural hospitals with fewer than 50 beds (Moscovice et. al., 2004). The measures identified as relevant for small rural hospitals included the initial ten Hospital Compare measures for heart attack, heart failure, and pneumonia, as well as an additional surgical infection prevention measure that is similar to the Hospital Compare surgical infection prevention measures. Additional quality measures were also developed or adapted to address small rural hospital Emergency Department timeliness of care and transfer communications. These measures have been field tested in small rural hospitals in Minnesota, Nevada and Utah in collaboration with the QIOs for those states, and in Washington working with the Washington State Rural Healthcare Quality Network.

***Defining Minnesota's rural hospitals.*** Minnesota currently has 135 acute care hospitals (not including federal Veterans Administration and Indian Health Service facilities or state operated treatment centers). For this article, rural hospitals were defined as hospitals located in Minnesota's 66 non-metropolitan counties as well as



**Table 1:** Participation of Minnesota Critical Access Hospitals and rural non-CAHs in Hospital Compare.

	2005	2006
<b>Critical Access Hospitals</b>	17 (24%)	44 (55%)
<b>Rural Non-CAH Hospitals</b>	34 (100%)	21 <sup>1</sup> (100%)

<sup>1</sup>Includes one Indian Health Service hospital.

Data sources: Centers for Medicare and Medicaid Services' Hospital Compare data for January – December 2004 (as of September 2005) and January – December 2005 inpatient hospital discharges (as of September 2006); Flex Monitoring Team CAH List, 2006.

hospitals that are certified by Medicare as critical access hospitals. A total of 100 hospitals meet these criteria: 20 hospitals not designated as CAHs that are located in non-metropolitan counties and 80 CAHs. (Fourteen Minnesota CAHs are located in metropolitan counties, but are considered rural under Federal CAH regulations.)

## Results: A Look at Various Quality of Care Measurements

**Health Care Quality in Minnesota.** Overall, Minnesota ranks high on state-by-state comparisons of health care quality. In a national assessment of the quality of care provided to Medicare beneficiaries, Minnesota ranked seventh among 50 states plus the District of Columbia and Puerto Rico in 1998-99 and tenth in 2000-2001 (Jenks, Huff & Cuerdon, 2003). On 15 measures of health care quality in the Agency for Healthcare Quality and Research's 2005 National Healthcare Quality Report, Minnesota ranked in the top ten states for six measures and in the top 20 states for an additional six measures (AHRQ, 2005). These national data are not reported separately for rural and urban populations, however. At the state level, Minnesota health plans and providers report data on a number of different quality measures, but these data are not usually reported separately for rural and urban populations either. Therefore, this article instead focuses on Hospital Compare and Leapfrog Group data, which are available at the hospital level.

**Hospital Compare Results for Rural Minnesota Hospitals.** All rural non-CAH hospitals in Minnesota that were required to participate in Hospital Compare to receive their full Medicare payment update submitted data on quality measures for 2004 and 2005 inpatient discharges (Table 1). (The number of rural non-CAH hospitals decreased and the number of CAHs increased during this time

period because of CAH conversions.) Although they were not required to, 17 Minnesota CAHs participated in Hospital Compare in 2005 and 44 participated in 2006 (participation is defined as submitting data on at least one quality measure for discharges in the previous year). The Minnesota CAH participation rate of 24% for 2005 was lower than the national CAH participation rate of 41%, but increased considerably in 2006 with 55% of Minnesota CAHs participating, compared to 53% of CAHs nationally.

Table 2 compares the percent of patients receiving recommended care for heart attack, heart failure and pneumonia in CAHs and other rural hospitals in Minnesota to national percentages using quality measure data for 2004 discharges reported to Hospital Compare. For each measure, the percentage of patients in CAHs and in other rural hospitals that received the recommended care were calculated by dividing the total number of patients in all hospitals in the group who received the recommended care by the total number of eligible patients for each measure.<sup>3</sup>

Tests of the differences in proportions of patients in hospitals in each group that received the recommended care were conducted to determine which differences were statistically significant. For four heart attack measures, Minnesota CAHs had an insufficient number of patients to compare results with CAHs nationally. On most of the remaining measures for heart attack, heart failure, and pneumonia patients, the results for Minnesota CAHs were not significantly different from those of CAHs nationally. Minnesota CAHs had significantly lower scores on two measures: smoking cessation advice for heart failure patients and pneumococcal vaccination status for pneumonia patients.

Minnesota rural non-CAHs had insufficient numbers of patients on two heart attack measures to compare their results with rural non-CAHs nationally but had significantly higher scores than rural non-CAHs nationally on eight measures, including three heart attack measures (aspirin at arrival, beta blocker at arrival, and beta blocker at discharge), the heart failure discharge instructions measure, and four pneumonia measures (oxygenation assessment, pneumococcal vaccination status, initial antibiotic within four hours, and smoking cessation advice). On nine measures, their scores were not significantly different from hospitals nationally.

A total of 49 Minnesota CAHs and rural non-CAH hospitals submitted quality measure data to Hospital Compare for both 2004 and 2005 discharges. Table 3 compares rates for these hospitals for both years (data for CAHs and non-CAHs are combined because several hospitals changed status from non-CAH to CAH during this time).

**Table 2: Percent of patients receiving recommended care in Critical Access Hospitals (CAHs) and rural non-CAHs in Minnesota and nationally in 2004.**

Condition	Measure	CAHs			Rural Non-CAHs	
		Minnesota (n = 17)	U.S. (n = 468)	Minnesota (n = 34)	U.S. (n = 1,133)	
Heart Attack	Aspirin at arrival	91.3	89.8	95.1***	91.7	
	Aspirin prescribed at discharge	90.8	84.3	91.6	89.3	
	ACE inhibitor for LVSD	1	74.4	80.9	76.0	
	Beta blocker at arrival	82.2	80.5	92.4***	84.3	
	Beta blocker prescribed at discharge	76.9	81.4	93.5***	87.2	
	Smoking cessation advice	1	47.7	77.1	81.2	
Heart Failure	Thrombolytic within 30 minutes of hospital arrival	1	30.0	1	40.0	
	PCI within 120 minutes of arrival	1	1	1	62.8	
	Assessment of left ventricular function	61.7	64.2	77.7	76.1	
	ACE inhibitor for LVSD	73.3	73.4	75.8	72.5	
	Discharge instructions	48.4	44.8	63.2***	49.6	
	Smoking cessation advice	32.0**	56.9	68.0	68.6	
Pneumonia	Oxygenation assessment	98.3	98.3	99.3***	97.4	
	Pneumococcal vaccination status	48.8**	55.1	54.6*	52.1	
	Initial antibiotic within 4 hours of hospital arrival	84.3	82.3	80.6***	76.2	
	Blood culture prior to first antibiotic	85.2	82.4	84.2	83.0	
	Smoking cessation advice	61.3	58.4	73.3*	66.6	
	Appropriate initial antibiotic selection	73.2	74.5	74.7	73.4	

<sup>†</sup>Data on this measure were reported for less than 25 patients total.

\*\*\*Significant differences in proportions of Minnesota and national patients receiving recommended care at  $p < .001$ .

\*\*Significant differences in proportions of Minnesota and national patients receiving recommended care at  $p < .01$ .

\*Significant differences in proportions of Minnesota and national patients receiving recommended care at  $p < .05$ .

Data source: Centers for Medicare and Medicaid Services' Hospital Compare data for January – December 2004 inpatient hospital discharges (downloaded from CMS website September 2005).

**Table 3:** Percent of patients receiving recommended care in Minnesota Critical Access Hospitals and non-CAH rural hospitals in 2004 and 2005 (N = 49)<sup>1</sup>

Condition	Measure	2004	2005
Heart Attack	Aspirin at arrival	94.6	93.0
	Aspirin prescribed at discharge	91.8	91.8
	ACE inhibitor or ARB for LVSD	80.9	85.0
	Beta blocker at arrival	91.1	90.7
	Beta blocker prescribed at discharge	91.7	91.1
	Smoking cessation advice	71.9	83.1
	Thrombolytic within 30 minutes of arrival	35.7	38.2
Heart Failure	Assessment of LVF	75.5	79.0**
	ACE inhibitor or ARB for LVSD	75.2	81.6**
	Discharge instructions	60.6	57.6
	Smoking cessation advice	61.9	70.5
Pneumonia	Oxygenation assessment	99.1	99.5*
	Pneumococcal vaccination status	54.0	72.6***
	Initial antibiotic within 4 hours of arrival	81.1	83.5**
	Blood culture prior to first antibiotic	84.4	85.0
	Smoking cessation advice	70.7	70.5
	Appropriate initial antibiotic selection	74.4	79.3***

<sup>1</sup>Only hospitals that reported data for both 2004 and 2005 discharges are included.

\*\*\*Significant differences in proportions of patients receiving recommended care in 2004 and 2005 at p< .001.

\*\*Significant differences in proportions of patients receiving recommended care in 2004 and 2005 at p< .01.

\*Significant differences in proportions of patients receiving recommended care in 2004 and 2005 at p< .05.

Data source: Centers for Medicare and Medicaid Services' Hospital Compare data for January – December 2004 (as of September 2005) and January – December 2005 inpatient hospital discharges (as of September 2006).

As a group, these hospitals significantly improved their performance on two heart failure measures (assessment of LVEF and ACE inhibitor/ ARB for LVSD) and four pneumonia measures (oxygenation assessment, pneumococcal vaccination status, initial antibiotic within four hours of arrival, and appropriate initial antibiotic selection.) Changes in some measures are not statistically significant, in part, because they are based on a small number of patients.

Several points are important to consider when evaluating these results. The data presented here are averages for CAHs and rural non-CAHs, but there is variation within these groups, with some hospitals performing better than the average and others performing worse. The CAHs are a self-selected group that voluntarily chose to participate in Hospital Compare, so their results are not necessarily representative of all CAHs in Minnesota or nationally.

Some differences in the proportions of patients receiving recommended care may be due to lack of experience with documentation and reporting on the measures besides actual differences in the care provided. In particular, small rural hospitals that are not JCAHO accredited are likely to have had less experience collecting and reporting data on these quality measures than larger accredited hospitals, which have reported data for patients with these conditions to JCAHO since 2002.

Rural Minnesota hospitals' lowest scores include several measures for which hospitals may need to improve their documentation in medical records, including smoking cessation, pneumococcal vaccination, and heart failure discharge instruction. The past experience of JCAHO accredited hospitals suggests that scores on the smoking cessation measures tend to improve quickly as hospitals become more familiar with the measures and documentation requirements (Williams, Schmaltz, Morton et. al., 2005).

***Minnesota rural hospital participation in Leapfrog.*** The initial three Leapfrog Group "leaps" — implementation of computerized physician order entry systems, staffing of intensive care units with intensivists, and evidence-based referral for certain complex medical procedures — were targeted to urban hospitals. The fourth leap measures hospital performance on 27 National Quality Forum-endorsed safe practices, and Leapfrog has determined that 26 of these practices are applicable to rural hospitals (Figure 2).

As of November 2006, almost one fourth of Minnesota CAHs and half of non-CAH rural hospitals had voluntarily submitted data

**Figure 2:** National Quality Forum Safe Practices in Leapfrog Group’s Fourth Leap Applicable to Rural Hospitals.

Create a healthcare culture of safety.
Pharmacists should actively participate in the medication-use process, including, at a minimum, being available for consultation with prescribers on medication ordering, interpretation and review of medication orders, preparation of medications, dispensing of medications, and administration and monitoring of medications.
Verbal orders should be recorded whenever possible and immediately read back to the prescriber—i.e., a healthcare provider receiving a verbal order should read or repeat back the information that the prescriber conveys in order to verify the accuracy of what was heard.
Use only standardized abbreviations and dose designations.
Patient care summaries or other similar records should not be prepared from memory.
Ensure that care information, especially changes in orders and new diagnostic information, is transmitted in a timely and clearly understandable form to all of the patient’s current healthcare providers who need that information to provide care.
Ask each patient or legal surrogate to recount what he or she has been told during the informed consent discussion.
Ensure that written documentation of the patient’s preference for life-sustaining treatments is prominently displayed in his or her chart.
Implement a standardized protocol to prevent the mislabeling of radiographs.
Implement standardized protocols to prevent the occurrence of wrong-site procedures or wrong-patient procedures.
Evaluate each patient undergoing elective surgery for risk of an acute ischemic cardiac event during surgery, and provide prophylactic treatment of high-risk patients with beta blockers.
Evaluate each patient upon admission, and regularly thereafter, for the risk of developing pressure ulcers. This evaluation should be repeated at regular intervals during care. Clinically appropriate preventive methods should be implemented consequent to the evaluation.
Evaluate each patient upon admission, and regularly thereafter, for the risk of developing deep vein thrombosis (DVT)/venous thromboembolism (VTE). Utilize clinically appropriate methods to prevent DVT/VTE.
Utilize dedicated anti-thrombotic (anti-coagulation) services that facilitate coordinated care management.
Upon admission, and regularly thereafter, evaluate each patient for the risk of aspiration.
Adhere to effective methods of preventing central venous catheter-associated blood stream infections.

Evaluate each pre-operative patient in light of his or her planned surgical procedure for the risk of surgical site infection, and implement appropriate antibiotic prophylaxis and other preventive measures based on that evaluation.
Utilize validated protocols to evaluate patients who are at risk for contrast media-induced renal failure, and utilize a clinically appropriate method for reducing risk of renal injury based on the patient's kidney function evaluation.
Evaluate each patient upon admission, and regularly thereafter, for risk of malnutrition. Employ clinically appropriate strategies to prevent malnutrition.
Whenever a pneumatic tourniquet is used, evaluate the patient for the risk of an ischemic and/or thrombotic complication, and utilize appropriate prophylactic measures.
Decontaminate hands with either a hygienic hand rub or by washing with a disinfectant soap prior to and after direct contact with the patient or objects immediately around the patient.
Vaccinate healthcare workers against influenza to protect both them and patients from influenza.
Keep workspaces where medications are prepared clean, orderly, well lit, and free of clutter, distraction, and noise.
Standardize the methods for labeling, packaging, and storing medications.
Identify all "high alert" drugs (e.g., intravenous adrenergic agonists and antagonists, chemotherapy agents, anticoagulants and anti-thrombotics, concentrated parenteral electrolytes, general anesthetics, neuromuscular blockers, insulin and oral hypoglycemics, narcotics and opiates).
Dispense medications in unit-dose or, when appropriate, unit-of-use form, whenever possible.

Source: Leapfrog Group, 2006.

to the Leapfrog Group on the safe practices leap (Table 4). Of the 29 participating rural hospitals, eight did not yet meet Leapfrog's criteria for a good early stage effort; six were making a good early stage effort; eight were making good progress in implementation; and seven had fully implemented the leap.

As is the case with CAHs and Hospital Compare, the rural hospitals that provided data to Leapfrog voluntarily chose to participate, so their results are not necessarily representative of all rural hospitals in Minnesota. While a number of the participating hospitals are in the early stages of implementing the safe practices leap, seven hospitals, including three CAHs, have fully implemented the leap, suggesting that full implementation is an achievable goal for motivated rural hospitals.

**Table 4:** Leapfrog participation and scores for Minnesota Critical Access Hospitals and non-CAH rural hospitals.

	<b>Critical Access Hospitals</b> (n = 80)	<b>Rural Non-CAHs</b> (n = 20)
<b>Participation in Leapfrog Safe Practices Leap</b>	19 (24%)	10 (50%)
<b>Safe Practices Leap Score</b>		
Willing to report publicly; did not yet meet Leapfrog’s criteria for a good early stage effort	8	0
Good early stage effort in implementing the leap	5	1
Good progress in implementing the leap	3	5
Fully implemented the leap	3	4

Data source: Leapfrog Group Hospital Quality and Safety Survey Results, 2006.

**Implementation of Medication Safety Practices in Rural Hospitals.**

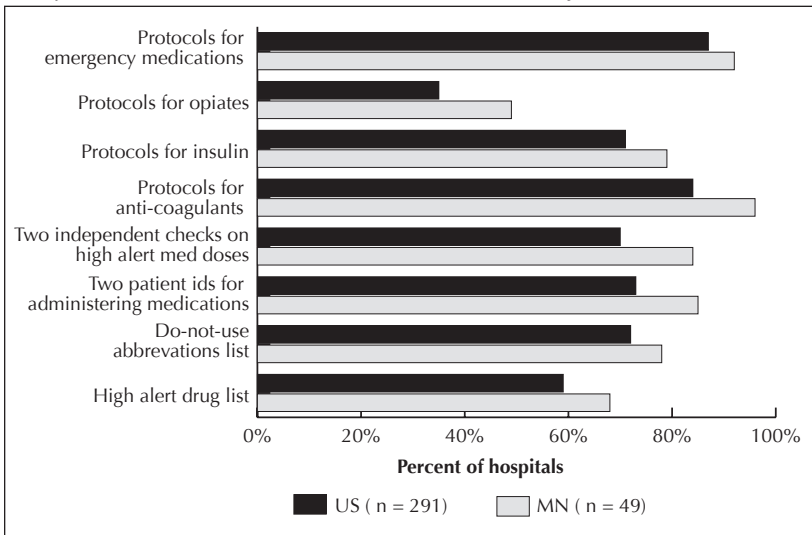
Medication safety is an important quality issue for rural hospitals. JCAHO, NQF, the Institute for Safe Medication Practices (ISMP) and other national- and state-level quality organizations have recommended that hospitals implement key medication safety practices. However, rural hospitals face special challenges in implementing these safety practices because of limited pharmacist staffing, less availability of technology such as computerized pharmacy systems, and limited financial and other resources.

In 2005, the University of Minnesota Rural Health Research Center conducted a national survey of rural hospitals about their implementation of medication safety practices (Casey, Moscovice & Davidson, 2006). The University of Minnesota College of Pharmacy surveyed additional small rural Minnesota hospitals using the same survey questions (Shermoen & Sorensen, 2006). Surveyed hospitals were asked about their implementation of four key medication safety practices:

- 1) a “do-not-use” abbreviation list (medical abbreviations, symbols and dose designations that have often contributed to serious errors and should never be used);
- 2) a policy of using two patient identifiers for administering medications;



**Figure 3:** Implementation of medication safety practices in rural hospitals with fewer than 50 beds, in Minnesota and nationally, 2005.



Data Sources: Shermoen and Sorensen, 2006; Unpublished data from the University of Minnesota Rural Health Research Center survey of rural hospitals, 2005.

- 3) a high alert drug list (drugs that have a high risk of causing serious injury or death if misused); and
- 4) a policy of having two health professionals independently check doses of high alert medications.

They were also asked if they had implemented protocols for administering four types of high alert medications: emergency medications such as epinephrine drip and nitroglycerin; anti-coagulants; insulin; and opiates. The goal is to have each practice implemented by 100% of hospitals.

Figure 3 compares results for the 49 Minnesota hospitals in the national and Minnesota surveys with the 291 hospitals with 50 beds or less from the national survey. As the chart shows, small rural hospitals in Minnesota were more likely than those nationally to have implemented the four medication safety practices and protocols for the four types of medications. However, like small rural hospitals nationally, Minnesota hospitals still have work to do to achieve full implementation of the practices and protocols.

***Improving the Quality of Care in Rural Minnesota Hospitals.***

The Hospital Compare results provide an opportunity to assess how rural hospitals in Minnesota compare with hospitals nationally on quality measures for conditions commonly cared for in those facilities and how their performance changed from 2004 to 2005. In 2004, the Minnesota CAHs performed as well as CAHs nationally on the majority of quality measures, and the rural non-CAHs performed as well or better than their counterparts nationally on all measures. Since the goal is for all hospitals to improve their performance over time, it is encouraging that the results for Minnesota rural hospitals with two years of data show significant improvement on several measures.

While Minnesota rural hospitals compare favorably overall with rural hospitals nationally on the Hospital Compare measures and medication safety practices, performance still needs to improve to meet the goal of 100% implementation of evidence-based practices. A key component of quality improvement is the use of clinical guidelines and protocols to address processes of care within the hospital and decisions regarding transfer of patients. Cardiac care appears to be an especially important area where many small rural hospitals could improve implementation of clinical guidelines and protocols. According to one recent survey, one third of the 104 predominantly rural Minnesota hospitals without cardiac catheterization labs do not have hospital-specific guidelines, protocols or standing orders for treatment of heart attacks, and only 8% of guidelines address criteria for triage and transfer of patients to a tertiary cardiovascular center (Larson, Sharkey Unger, & Henry, 2005).

**Making quality of care standards and measures available to all hospitals**

Resources are available to help rural hospitals implement clinical guidelines and protocols, medication safety practices, and health information technology, which can facilitate efforts to measure and improve the quality of health care (Figure 4). The Agency for Healthcare Research and Quality maintains the National Guideline Clearinghouse, a public resource for evidence-based clinical practice guidelines. The Medicare Quality Improvement Community, a national knowledge forum for healthcare and quality improvement professionals, and Stratis Health, Minnesota's QIO, provide links to tools and strategies for improving the quality of care for heart attack, heart failure, pneumonia and surgical patients, as well as other medical conditions on their websites.

**Figure 4: Quality Improvement Resources for Rural Hospitals**

<p><b>Clinical Guidelines and Protocols</b></p> <p>The Agency for Healthcare Research and Quality National Guideline Clearinghouse <a href="http://www.guideline.gov/">http://www.guideline.gov/</a></p> <p>The Medicare Quality Improvement Community (MedQIC) <a href="http://www.medqic.org/">http://www.medqic.org/</a></p> <p>Stratis Health. Tools &amp; Resources Catalog. <a href="http://www.stratishealth.org">http://www.stratishealth.org</a></p>
<p><b>Medication Safety Tools</b></p> <p>American Hospital Association, Health Research and Educational Trust and the Institute for Safe Medication Practices. Pathways for Medication Safety. <a href="http://www.medpathways.info/medpathways/tools/tools.html">http://www.medpathways.info/medpathways/tools/tools.html</a></p> <p>Institute for Healthcare Improvement (IHI). Medication Systems Tools. <a href="http://www.ihl.org/IHI/Topics/PatientSafety/MedicationSystems/Tools/">http://www.ihl.org/IHI/Topics/PatientSafety/MedicationSystems/Tools/</a></p> <p>Institute for Safe Medication Practices (ISMP). Medication Safety Tools and Resources. <a href="http://www.ismp.org/Tools/default.asp">http://www.ismp.org/Tools/default.asp</a></p> <p>Joint Commission on Accreditation of Healthcare Organizations (JCAHO). "The Official 'Do Not Use' List." <a href="http://www.jointcommission.org/PatientSafety/DoNotUseList/">http://www.jointcommission.org/PatientSafety/DoNotUseList/</a></p>
<p><b>Grant Programs</b></p> <p>Federal Office of Rural Health Policy. Grants to Rural Providers. <a href="http://ruralhealth.hrsa.gov/funding/GrantPrograms.htm#providers">http://ruralhealth.hrsa.gov/funding/GrantPrograms.htm#providers</a></p> <p>Minnesota Department of Health. Office of Rural Health and Primary Care. Grant and Loan Information. Available at: <a href="http://www.health.state.mn.us/divs/chs/grants.htm#rural">http://www.health.state.mn.us/divs/chs/grants.htm#rural</a></p>

Resources are available from the American Hospital Association, ISMP, the Institute for Healthcare Improvement, and JCAHO to help hospitals assess and improve their medication use systems, develop organizational strategic plans for medication safety, and implement specific tools such as do-not-use abbreviation and high alert medication lists.

Through the Rural Hospital Flexibility Program (Flex Program), the federal Office of Rural Health Policy provides grants to states to help implement initiatives to strengthen the rural health care infrastructure. Both the Flex Program and Medicare QIOs have a goal of increased CAH participation in Hospital Compare. In Minnesota, CAH participation increased considerably from 2004 to 2005, but 45% of CAHs did not provide data for 2005. Data from these hospitals would help give a more complete picture of the quality of care being provided by rural hospitals in the state.

Improving the quality of care provided by CAHs is an overall goal of the Flex Program, a program especially important for Minnesota since a large percentage of Minnesota's rural hospitals are CAHs. The Office of Rural Health and Primary Care at the Minnesota Department of Health has used Flex grant funds to help support several CAH quality improvement initiatives, including collaborative efforts with Stratis Health, Minnesota's QIO. Flex funds have also helped support participation of CAHs in Comprehensive Advanced Life Support Program training to improve the quality of emergency care provided in rural hospitals.

Small rural hospitals and clinics are less likely than larger urban facilities to have implemented clinical health information technology (HIT) applications such as electronic medical records (Flex Monitoring Team, 2006b; MDH, 2006). CAHs and other small rural hospitals in Minnesota can apply for funding to help implement HIT from the federal Office of Rural Health Policy's grant programs, including the Small Hospital Improvement Program, and from state grant programs administered by ORHPC, including the Rural Hospital Planning and Transition and Rural Hospital Capital Improvement grant programs.

## **Endnotes**

<sup>1</sup> The majority of acute care hospitals are paid under the PPS system for Medicare admissions. The PPS system is based on paying the average cost for treating patients in the same Diagnosis Related Group (DRG). A DRG is assigned to each patient based on their principal diagnosis, complications and comorbidities, surgical procedures, age, gender, and discharge disposition.

<sup>2</sup> According to CMS, many psychiatric, children's, rehabilitation and long-term care hospitals have agreed in principle to provide data using standard quality measures, but do not currently report data because the conditions being measured (care of adults with a heart attack, heart failure, or pneumonia or having surgery) are less commonly treated in these settings.

<sup>3</sup> An alternative method of comparing the performance of hospitals is to calculate mean scores for each hospital individually, and then calculate an average for each group. An advantage of this method is that each hospital contributes equally to the groups' means. However, this "average of averages" method can give a less accurate picture of the performance of a group of hospitals when a large number of the facilities have very small numbers of patients for the measures, as is currently the case with CAHs. For example, if one hospital had 10 out of 20 patients and another hospital had 70 out of 100 patients receiving recommended care for a given measure, the aggregate score across the hospitals would be 67% (80 out of 120 patients). Using the alternative "average of averages" method, the score would be 60%, the average of 50% (10/20) and 70% (70/100).

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