



Refining and Field Testing a Relevant Set of Quality Measures for Rural Hospitals

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Introduction

The interest in measurement of hospital quality through measures of clinical processes and outcomes has seen a dramatic increase in the past few years. Accreditation organizations have proposed new measurement strategies, purchaser coalitions have pushed for the adoption of new hospital quality measures, and government agencies have developed algorithms for measuring hospital performance using discharge data. The National Quality Forum (NQF) has approved a performance measurement set for U.S. hospitals, but no organization, to date, has proposed a quality measurement set specific to rural hospitals.

One could argue that “quality is quality,” and that quality and measurement should not vary across types of hospitals. However, because contextual characteristics, such as location, size, scope of services, staffing, structure, and affiliation, vary systematically across hospitals, they pose differing challenges in care process demands on a hospital. Effective quality measurement should be sensitive to these differences. In previous work, quality measures were identified that address these differences, developing a set of quality measures customized for rural hospitals (Moscovice et al. 2004; Wholey et al. 2004).

Field Testing of Rural Hospital Quality Measures

This report discusses a field test of these rural hospital quality measures in a sample of rural hospitals in Minnesota, Nevada, and Utah. The use of three diverse states allowed for the ability to examine hospital culture from the more urban rural to the frontier rural environment. These distinctions produced important findings in all aspects of the study—from the initial recruitment through the training and abstraction phase, and in the final study results.

The goal of the study, which was funded by CMS, was to determine the feasibility of obtaining quality measures from rural hospitals. The field testing was completed by a partnership with the Quality Improvement Organizations (QIOs) representing Minnesota, Nevada, and Utah, and the Rural Health Research Center at the University of Minnesota. QIO staff and the University recruited and trained 22 hospitals that participated in the field test. Rural hospital staff collected data to measure inpatient, emergency department, and administrative quality from April 2004 to September 2004. Hospital staff was surveyed prior to the study, mid-study, and post-data collection to collect information related to the quality measurement process, including the ease of data collection and the usefulness of the reports prepared for the hospitals. Information on hospital recruitment, training, and reporting processes was also collected.

Technical Expert Panel

The recommendations of the Technical Expert Panel (TEP) after the field testing of the measures are also discussed in this report. Insights gathered from the hospitals regarding the ease of data collection and feasibility are also incorporated into the discussions for each measure.

The Technical Expert Panel convened to augment the field test of the measures and to provide further feedback. Their goal was to provide input on how generalizable the measures were nationally, their usefulness, and the reliability of the measures nationally. They also were charged with giving guidance and making recommendations for the new measurement areas on the relevance to stakeholders and the validity of the data.

Report Contents

In this report, the background information on quality measurement in a rural hospital context is reviewed first. A description is provided next of the field study methods, sample recruitment, training, inter-rater reliability assessment, the data collection for quality measures, and hospital staff surveys about the quality measurement process. In the next part of the report, the quantitative and qualitative results from the rural hospitals and TEP are presented. Finally, the report provides the study team's overall assessment of the measures, lessons learned through hospital recruitment, training, and technical assistance and convening of the expert panel, and suggestions for the next steps for rural hospital quality measurement.

Rural Hospital Environment and Quality Measurement

Rural and urban contextual differences affect quality measurement. Rural hospitals tend to be smaller, perform a smaller variety of procedures, have a greater proportion of elderly patients, and are less complex organizations than urban hospitals. Rural hospitals also rely more on family practitioners and generalists than urban hospitals because they do not have the condition-specific volumes necessary to support specialized staff. Rural hospital resource environments are more constrained than urban hospitals. Because of the rural hospital's location and its more limited range of services, the rural hospital serves as a link between rural residents and urban care facilities, particularly after patient stabilization.

While many aspects of hospital quality are similar for urban and rural hospitals (e.g., providing heart attack patients with aspirin), the urban/rural contextual differences result in differences in emphasis on quality measurement. Because of its role in linking residents to urban referral centers, important aspects of rural hospital quality include triage-and-transfer decision making about when to provide a particular type of care, transporting patients, and coordinating information flow to specialists beyond the community. In our previous research, a model for measuring rural hospital quality was developed, with a focus on the special issues posed by the rural hospital context (Moscovice et al. 2004). With the assistance of a panel consisting of rural hospital and hospital quality measurement experts, an initial core set of quality measures relevant to rural hospitals with fewer than 50 beds was identified.

Twenty-one measures were identified, including ten core Joint Commission on Accreditation of Healthcare Organization (JCAHO) measures related to community-acquired pneumonia, heart failure (HF), and acute myocardial infarction (AMI); three measures related to infection control; three measures related to medication dispensing and teaching; two procedure-related measures; one financial measure; and two other measures related to the use of advance directives and the monitoring of emergency department (ED) trauma vital signs. This set of quality measures for rural hospitals was used as the starting point for a field study of rural hospital quality measurement. The research partners further refined this draft set of existing quality measures to fit the rural context and developed additional measures that are relevant to rural hospitals and that are not included in existing quality measurement systems (e.g., measures related to the triage, referral, and transport of patients).

Study Overview

Field Testing the Measures

The purpose of the first phase of the study was to field test the feasibility of collecting a set of relevant quality measures from rural hospitals that are supported in the quality measurement process by QIO technical assistance. The study also preliminarily assessed the internal and external usefulness of the measures as well as the ease of data collection.

The field study was organized as a collaboration between the Rural Health Research Center at the University of Minnesota; Stratis Health (the QIO for Minnesota), and *HealthInsight* (the QIO for Utah and Nevada). Stratis Health worked with the Rural Health Research Center at the University of Minnesota to refine the quality measures and design the field test. Stratis Health and *HealthInsight* recruited hospitals for the study and provided training and technical support to hospitals participating in the field test.

Staff from both Stratis Health and *HealthInsight* was assigned to coordinate the field study with participating hospitals. Stratis Health staff was familiar with each hospital because staff members are assigned hospitals in various regions in the state, converse regularly with the hospitals, and encourage hospital staff to call with questions. *HealthInsight* staff was less familiar with each hospital's staff because *HealthInsight* staff members are responsible for a broader geographic area and for multiple projects.

The study process consisted of: 1) identifying the hospital population and hospital sample; 2) a pre-training survey of each hospital's background in quality measurement and expectations for the field study; 3) training hospital data abstractors and assessing inter-rater reliability; 4) data collection over a six-month period; 5) feedback of the quality measures based on the first three month's data and a mid-study survey to measure reactions to the measurement process; and 6) feedback of the quality measures based on six month's data, and 7) a final survey to measure reactions to the measurement process and the usefulness of the measures. The final survey was completed in April 2005.

The feedback of quality measures to hospitals occurred with two reports—one after three months of data collection, and another after six months of data collection. The first report, the Rural Hospital Quality Measures Project: Preliminary Data Report to Hospitals, contained three months (April 2004-June 2004) of submitted data on the measures for 20 hospitals (two hospitals did not submit their data in time to be included in the first report). The first report was delivered to the hospitals in October 2004 and the second report in January 2005. (See Appendix 1: Rural Hospital Quality Measures Project: Aggregate Data Report and Appendix 2: Description of Rural Hospital Quality Measures.)

The reports include background information on the measurement areas (e.g., heart failure, AMI, etc.); background on the significance of the specific measure to quality, such as the importance of the administration of aspirin within 24 hours for chest pain/AMI; specific measurement descriptions (e.g., numerator/denominator/exclusions); national rates for each specific measure if they were available; total rates from all hospitals reporting each measure in the study; and lists of available resources for quality improvement strategies in specific topic areas.

Throughout the field study, a strong emphasis was placed on obtaining hospital staff insights. Evaluation of the measures, data collection, report usefulness, and the overall process was requested from hospital representatives at many points. Hospital and QIO staff was asked to

maintain a log of comments regarding the project, including suggestions for improvements. Feedback forms and contact information for hospital and QIO staff involved in this project were provided during training sessions. Each time a hospital was contacted, comments were requested regarding the project. Hospitals were invited to call the QIO or University staff at any time with questions, comments, or concerns.

Convening A Technical Expert Panel

A Technical Expert Panel comprised of sixteen national experts in rural health was convened to review the findings of the field test and provide feedback about the inclusion of specific measures in a revised set of quality measures relevant for rural hospitals. The feedback of the expert panel, as well as the experience of the rural hospitals participating in the field test, will inform policymakers and program developers about the feasibility for small rural hospitals to collect and interpret the rural-relevant measures.

The panel met on April 7 and April 8, 2005. The results of this meeting are included in the Methods and Results section titled “Expert Panel Process and Results.”

Methods and Results

The description of methods and presentation of results are organized by each major activity evaluated. The major activities are sample selection, training, inter-rater reliability assessment, measures, hospital surveys and feedback, and the convening and results of the Technical Expert Panel.

Sample Selection

Methods

The study population included all rural hospitals with 50 or fewer beds in Minnesota, Utah, and Nevada. The study population included 81 Minnesota hospitals, 12 Nevada hospitals, and 19 Utah hospitals, of which 14 hospitals from Minnesota, 4 hospitals from Utah, and 4 hospitals from Nevada participated in the study. The research team sought representation from Critical Access Hospitals (CAH), system/independent hospitals, and JCAHO-accredited hospitals in the study sample.

The hospitals were recruited for the study in Fall 2003. QIO presentations of the proposed study were made to the Nevada FLEX/CAH Committee (Nevada Office of Rural Health and University of Nevada School of Medicine small/rural hospital committee), the Utah/Nevada FLEX Quality Improvement Committee meeting attendees, and the Minnesota Hospital Association's small/rural hospital committee. In Utah, *HealthInsight* described the study to a rural health quality consultant of Utah's largest hospital corporation, which included several rural hospitals. The presentations described the project, the opportunity to influence national policy, and similarities with the hospitals' current data collection efforts.

Next, a recruitment letter was sent from each QIO CEO to the CEO and Quality Improvement contact at each eligible hospital in February and March 2004. (See Appendix 3: Hospital Recruitment Letter.) The recruitment letter provided an overview of the study and expectations for hospital participants. The overview defined the subset of measures each hospital would be expected to collect (14 minimum from the 23 measures). (See Appendix 4: Rural Hospital Quality Measures Project: Benefits, Expectations, and Commitments.) Each hospital was expected to collect data on one assigned inpatient topic, all of the emergency department measures and data on at least two of the administrative measures. During hospital recruitment, QIOs provided information about the time commitment, volume requirements, and overlap with other national initiatives to assist hospitals in their participation decision.

Within two weeks of sending the invitation, 17 hospitals had responded and expressed interest in participating. More than half of the responding hospitals were already participating in local QIO collaboratives. Because the initial response from Minnesota hospitals met hospital participation targets, no additional solicitation was required. Nevada and Utah, with a markedly smaller number of eligible hospitals, continued with telephone follow-up to allow all hospitals the opportunity to participate.

In general, hospitals expressing interest in participation were excited to be asked to be a part of examining measures specific to their type of facilities and viewed the study as groundbreaking in its scope. In addition, these hospitals felt empowered by the contributions they could make to a national initiative. Hospitals that declined to participate in examining the measures cited the following reasons for their non-participation: volume, workload, and administrative reluctance.

Results

Table 1 compares participating and non-participating rural hospitals with fewer than 50 beds in Minnesota, Nevada, and Utah. Participating hospitals were slightly smaller in size and were less likely to be a CAH, JCAHO-accredited, or a system member.

Table 1. Characteristics of Participating and Non-Participating Rural Hospitals with Fewer Than 50 Beds in Minnesota, Nevada, and Utah

Rural Hospitals	Bed Size Range	Median Bed Size	CAH	JCAHO	System
Participating (n=22)	12-50	24	59%	24%	50%
Non Participating (n=90)	4-50	25	61%	25%	28%

Hospital recruitment was easier than anticipated. In Minnesota, all hospitals were recruited from initial invitations and one-on-one recruitment efforts were not required. In Nevada, although Nevada Rural Hospital Partners (NRHP), an advocacy group for CAH and CAH-eligible hospitals, had some concerns related to the confidentiality of information collected for this study, no more than two follow-up telephone calls were required to address questions prior to the hospitals' decisions to participate. In Utah, recruitment was time consuming because although administrators and their hospital staff were interested in the study, they were concerned about scarce hospital resources.

One difficulty encountered in some hospitals occurred because the CEO and quality staff failed to consult with each other prior to their initial commitment to the project, suggesting that communication should be sent directly to both the CEO and QI contact.

Lessons Learned

Lessons learned from the recruitment effort: 1) use existing collaborations, partnerships, and committees; 2) "test the waters" with these groups; 3) be aware of those facilities participating in other QIO activities to avoid and address conflicts; 4) be prepared to address time requirements, data collection components, etc. to acknowledge and alleviate concerns related to staffing and the Health Insurance Portability and Accountability Act of 1996 (HIPAA); and 5) make sure communication has occurred between the CEO and QI contact after the recruitment letter and materials are sent.

Training

Methods

Training Description

Small rural hospitals in Minnesota, Utah, and Nevada that agreed to participate in the rural-relevant hospital measurement project sent 1-2 staff for training on the selected rural-relevant measures. Training sessions were held in each of the three states by the two QIOs. The Stratis Health Abstraction Services Coordinator and the University of Minnesota Research Assistant conducted trainings.

The training sessions provided an overview of the project and addressed the following areas: 1) introduction to abstraction; 2) training specific to measures and practice chart abstraction for inpatient heart failure, pneumonia, and surgical infection prevention measures, and for ED measures for chest pain/AMI, vital signs for trauma patients, pneumonia, and transfer communication; 3) collection of administrative data: medication errors, adverse drug reactions, Cesarean section rates, laparoscopic cholecystectomy rates, Medicaid denial rates; and 4) completion of a medication safety checklist. (See Appendix 5: Rural Hospital Quality Measures Project Training Agenda; Appendix 6: Inpatient Data Collection Tools and Help Documentation; Appendix 7: Emergency Department Data Collection Tools and Help Documentation; Appendix 8: Medication Safety Checklist; and Appendix 9: Administrative Data Collection Tools and Help Documentation.)

Minnesota Training

Twenty-seven people, from all 14 participating Minnesota hospitals, attended the training at the Minnesota QIO office on May 6, 2004. All attendees had experience in abstraction and had worked with Stratis Health on similar projects. Because hospitals could elect to abstract for only one inpatient topic, the Minnesota training held breakout sessions for pneumonia, heart failure and surgical infection prevention training and practice abstractions.

Utah/Nevada Training

Fifteen people from ten hospitals attended a one-day group training at either the Nevada QIO office in Reno on May 13, 2004, or the Utah QIO office on May 14, 2004. Two multi-hospital system administrators attended the Utah session as an opportunity to become more familiar with the experience of the project. Stratis Health and University of Minnesota staff conducted both trainings. The trainings were presented in a more formal, didactic manner due to the trainers' increased experience with the material, but lack of familiarity with the attendees. Because breakout sessions were not required, hospitals could address two or more of the measurement categories of pneumonia, heart failure (HF), and surgical infection prevention (SIP). Several of the Nevada/Utah hospitals offered to participate in more than one of the categories, which may have been because of additional exposure to the measurement, or because their small size resulted in a smaller volume of charts.

Additional one-on-one trainings were held on-site for staff members from four hospitals that were unable to attend the group trainings. QIO project managers, rather than the trainers, conducted the on-site training in Utah. Training for the Nevada and Utah QIO project managers occurred at the training sessions in each state. Rather than conducting a formal training using a foundational, reference curriculum document, materials were shared and discussed between the Minnesota and Nevada/Utah QIO project managers. As a result, the on-site training may have

differed from the curriculum covered at the Minnesota and Nevada/Utah group training sessions.

Definitional Changes

The following definitional changes were made during the training:

- **Heart Failure, Pneumonia, Surgical Infection Prevention**
Discharge education for heart failure and documentation indicating that the patient or caregiver demonstrated an understanding of their medication regimen:
 - If a patient is discharged to a swing bed then to home, the patient will not be given discharge instructions for heart failure nor asked the discharge education question when moved to swing bed status. The hospitals can capture this information at the time of discharge from the swing bed rather than the acute bed.
 - Use the discharge date from the acute bed rather than the swing bed.
 - Add 61 as a valid discharge status for discharge instructions.
- **All ED Tools**
Documentation indicating that the patient or caregiver demonstrated an understanding of their medication regimen:
 - The definition was amended to add N/A (not applicable) as an option since there could be situations when the patient is not on any medications.
- **Pneumonia Tool**
Questions about caregiver assessed for and counseled on smoking:
 - The case definition was amended to add the inclusion of exposure to second-hand smoke to the help documentation.
- **ED Chest Pain/AMI Tool**
The definition was amended to include:
 - Patients who are under observation for chest pain; and
 - Patients who might be moved to another area of the hospital for care, but who are still not considered an acute care admission.

Evaluation of Training

Feedback from the training was positive, with over 95% of survey respondents agreeing or strongly agreeing that they:

- Could articulate the purpose of the rural measures project;
- Understand data abstraction guidelines;
- Could abstract medical records accurately and consistently using multiple topic specific tools; and
- Could collect and compile administrative data using a spreadsheet.

There were some comments regarding the value of a Medicaid measure and a suggestion to spend less time on the basics of data gathering.

Nevada and Utah each had hospitals that completed training, but were unable to continue with the project because of various constraints. Nevada had one hospital that was unable to continue due to staffing constraints. Utah had four hospitals that were unable to continue. Two were implementing CART and did not have the resources to continue with the project; one was not allowed to participate because of a corporate office decision, and one dropped out with no explanation.

Inter-Rater Reliability Assessment

Methods

Comparable quality measurement requires assurance that the measures are being abstracted consistently across hospitals and abstractors. Clear descriptions of the measures, abstraction procedures and consistent application of the procedures are necessary.

Inter-rater reliability (IRR) analysis ensures data quality and abstraction consistency by re-abstracting a sample of abstracted medical records from each hospital. For this study the abstraction services coordinator for Stratis Health was the second abstractor for all participants in the three states. During inter-rater reliability assessment, hospitals had the opportunity to make comments about measures they felt were confusing.

Inter-rater reliability consists of an element-to-element comparison between the two abstractions, which identifies problem areas in either measure definitions or abstraction procedures. The inter-rater reliability analysis process consists of each hospital's abstractor abstracting one to three medical records for each of the inpatient topics they were assigned, the three emergency department topics, and, at a minimum, one ED transfer tool. Three records were the goal; however, three records were not always feasible because of small patient volume at some hospitals. The abstracts and copies of the medical records were sent to the QIO abstractor who re-abstracted each record and compared findings with those of the hospital abstractor. The QIO abstractor contacted each hospital abstractor by phone or email to present the inter-rater reliability analysis, discuss any differences in findings, and clarify definitions. Once inter-rater reliability was established, the hospital abstractors continued with abstraction.

Results

Prior to the first quarter of data collection (April 2004 to June 2004), 197 medical records were abstracted at hospitals in three states. In 112 of those records (57%), the hospital abstractors' findings agreed completely with the QIO staff abstraction. Prior to the second quarter of data collection (July 2004 to September 2004), 137 medical records were abstracted at hospitals. In 108 of those records (79%), the hospital abstraction findings agreed completely with the QIO staff abstraction. It is important to note that the results reflect the number of medical records with at least one error, not number of errors per medical record.

Table 2 shows the total number of medical records abstracted for inter-rater reliability for each topic and the number of medical records with errors.

Table 2. Inter-Rater Results of Abstracted Medical Records

Topic	Quarter 1		Quarter 2	
	Medical Records	Medical Records with at least one error	Medical Records	Medical Records with at least one error
Emergency Department: Chest Pain/AMI	57	18	42	5
Emergency Department: Pneumonia	37	7	23	1
Emergency Department: Trauma	63	42	49	16
Emergency Department: Transfer	40	7	28	0
Inpatient: Heart Failure	13	2	5	2
Inpatient: Pneumonia	12	4	10	2
Inpatient: Surgical Infection Prevention	15	5	8	3
Total Number of Medical Records	197	85	137	29

Those individuals without previous experience in data collection required additional assistance with the collection of demographic data (e.g., age, race, or payer source). Hospital participants had few difficulties with collecting the inpatient measures. The emergency department measures were new to all participants and required additional clarification for most abstractors. The two main areas of difficulty in the ED data abstraction involved collecting patient arrival/discharge times and the recording of when vital signs were collected. Clarification of the abstraction definitions and applications were provided to the individual abstractors in a phone discussion with examples from their own records.

One difficulty that occurred during inter-rater reliability assessment was a delay in submission of some IRR records. This delay may have been due to hospital unfamiliarity with the process, hospital discomfort with sending records to an organization with whom they were unfamiliar, or because the hospitals were unable to attend the formal group training sessions, which necessitated training at a later date.

Measures

Methods

This section reviews the rural hospital quality measures. (See Appendix 10: Rural Hospital Quality Measures Definitions: Measure Specifications.) For each measure, adaptations to the measure to fit the rural hospital environment, the number of hospitals reporting the measure, and descriptive statistics for the measure for all reporting hospitals are reported. (Full hospital level results for inpatient and emergency department measures are presented in Appendix 11: Hospital-Level Data Tables.) It is important to note that the de-identified hospitals in the data tables are not consistent across measures, i.e., hospital A for inpatient heart failure is not hospital A for inpatient pneumonia. Each hospital was assigned different topics for data collection.

Inpatient measures include the topics of heart failure, pneumonia, and surgical infection prevention. Emergency department measures include chest pain/AMI, pneumonia, trauma vital sign monitoring, and transfer communication. Cross-cutting measures include advance directives, medication teaching, and medication safety checklist. Administrative measures are Cesarean-section rate, laparoscopic cholecystectomy rate, medication error rate, adverse drug event rate, and Medicaid denial rate.

Results

Table 3 shows the average number of patients for CAH and non-CAH hospitals where charts were abstracted for inpatient and emergency department topics. Patient volume is an issue often raised when evaluating quality in small rural hospitals. These volumes do not generally meet the CMS reporting threshold of 25 for a quarter but many would reach that threshold in a year of data collection.

The volumes reported here may not represent the universe of cases for these hospitals in these diagnostic categories since hospitals were asked to report only up to 30 cases per 6 months for the field test. None of the hospitals met the maximum of 30 cases for inpatient topics; however, they did use a sampling methodology for ED topics. Also, the volume of pneumonia cases in the second and third quarter of the year may not be reflective of the volume of pneumonia cases seen in the winter season.

Table 3. Average Number of Abstracted Cases by Diagnostic Category for CAH, Non-CAH, and Total Sample Rural Hospitals for April 2004-September 2004

	Bed size	HF Admits	INPT Pneu Admits	SIP Admits	ED CP/AMI Visits	ED Pneu Visits	ED Trauma Visits
CAH Averages	18.9	8.0	10.5	6.3	24.0	3.5	35.3
Non-CAH Averages	31.6	11.3	10.5	14.5	18.7	8.0	35.7
Average for All Hospitals in Study	24	9.9	10.5	11	21.8	5.4	35.4

Inpatient Measure: Heart Failure

There are four quality measures for rural heart failure inpatients: smoking assessment and counseling; angiotensin converting enzyme inhibitor (ACE Inhibitor) administration for those with documented left ventricular systolic dysfunction (LVSD) and without contraindications; left ventricular function (LVF) assessment in the hospital or scheduled; and discharge instructions documented for all six educational areas. One third of the hospitals were asked to report the heart failure measures.

Hospitals were able to collect data for these measures without difficulty. Small case volume will make for relatively unstable performance results at some of the hospitals. For these hospitals, external comparison could still be useful for quality improvement purposes, but the validity of public comparisons could be questioned. Of the seven hospitals reporting inpatient heart failure measures, three hospitals had ten or more cases that met case identification criteria in a six-month period. (See Appendix 11: Hospital-Level Data Tables.)

Because the ACE Inhibitor for LVSD measure excludes from the denominator patients without LVF assessment and the LVF assessment rate is low in some hospitals, the denominator for the ACE Inhibitor for LVSD measure is quite small for some hospitals. In combination, these two measures are useful for internal quality improvement, but very small numbers for the ACE Inhibitor for LVSD make external reporting a challenge.

Though smoking status was documented in 94% of cases across the reporting hospitals, only two smokers were identified. Since the smoking cessation and counseling measure excludes non-smokers, the denominator for this measure is very small for all hospitals, limiting its usefulness for external comparisons.

Table 4 shows the results for heart failure measures in the inpatient setting.

Table 4. Inpatient Measure: Heart Failure

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Smoking Assessment and Counseling	1	0.0%	none
LVF Assessment	7	49.2%	0-90.5%
ACEI for LVSD	3	69.2%	50-77.8%
Discharge Instructions	7	16.2%	0-50%

Inpatient Measure: Pneumonia

There are four quality measures for rural pneumonia inpatients: smoking assessment and counseling; initial antibiotic received within 4 hours of hospital arrival; oxygenation assessment; and pneumococcal vaccination assessment and administration. One third of the hospitals were asked to report the inpatient pneumonia measures. No adaptations were made to the measures for the small rural hospital setting. Participating hospitals also reported the percent of patients who were screened for smoking status and the percent of patients who were screened for pneumococcal vaccination status. This allows the measurement of both parts of each process, screening and intervention.

Hospitals were able to collect data for these measures without difficulty. Small case volumes will make for relatively unstable performance results at some of the hospitals. For these hospitals, external comparisons could still be useful for quality improvement purposes, but the validity of public comparisons could be questioned.

Of the eight hospitals reporting inpatient pneumonia measures, four had ten or more cases that met case identification criteria in a six-month period. (See Appendix 11: Hospital-Level Data Tables.)

The uniformly high performance on the oxygenation assessment measure indicates this measure is not likely to be useful for either internal quality improvement or for external reporting.

Table 5 shows the results for pneumonia measures in an inpatient setting.

Table 5. Inpatient Measure: Pneumonia

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Smoking Assessment and Counseling	7	15%	0-100%
Initial Antibiotic Received within 4 Hours of Hospital Arrival	8	76.2%	42.9-100%
Oxygenation Assessment	8	100%	none
Pneumococcal Assessment and Administration	7	32.6%	0-100%

Inpatient Measure: Surgical Infection Prevention (SIP)

There are three quality measures for SIP: prophylactic antibiotics received within one hour prior to surgical incision; prophylactic antibiotic selection for surgical patients; and prophylactic antibiotics discontinued within 24 hours after surgery end time. One third of the hospitals were asked to report the inpatient surgical measures.

Hospitals were able to collect data for these measures without difficulty. Of the seven hospitals that collected data for SIP, four had more than ten cases in the six-month time frame. This topic limited case identification procedure codes to a subset of the list used from the CMS SIP measures; a subset thought more likely to be performed at small rural hospitals. Procedures included were colon surgery, hip arthroplasty, knee arthroplasty, abdominal hysterectomy, and vaginal hysterectomy. The list could be extended to the full set of procedures used in the CMS SIP measures to maximize the number of cases in the measures.

Table 6 shows the results for the inpatient SIP measures.

Table 6. Inpatient Measure: Surgical Infection Prevention

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Prophylactic Antibiotics Received within 1 Hour Prior to Surgical Incision	7	49.4%	20-100%
Prophylactic Antibiotic Selection for Surgical Patients	7	72.7%	46.2-100%
Prophylactic Antibiotics Discontinued within 24 Hours After Surgery End Time	7	68.8%	0-100%

Emergency Department Measure: Chest Pain/Acute Myocardial Infarction (CP/AMI)

There are four quality measures for rural CP/AMI patients: aspirin within 24 hours of arrival; time to electrocardiogram (ECG); time to blood draw for cardiac indicators; and thrombolytic administration within 30 minutes of hospital arrival for patients who received a thrombolytic. All of the hospitals were asked to report the CP/AMI measures. Hospitals were also asked to report the time to transfer for those patients who were sent to a tertiary hospital for care. Time to transfer is meaningful for patients who will be receiving percutaneous coronary intervention (PCI) at the tertiary hospital. However, there are no standards available for the time to transfer measure.

These measures, in part, were adapted from the CMS/JCAHO inpatient AMI measures to apply to small rural hospital emergency departments. The adaptation was required because the CMS/JCAHO guidelines use inpatient discharge diagnosis codes for case definition and include only patients admitted to the hospital. Patients transferred to another acute care hospital are excluded from the discharge measures. This results in few cases for small rural hospitals. To address this issue a broader set of emergency department diagnosis codes was used.

The emergency department ICD-9-CM codes used to identify the patients in the ED sample were adapted from the inpatient AMI measures (410.xx) plus codes for chest pain (786.50, 786.52, 786.59), angina (411.1, 413.9), and acute coronary syndrome (411.89). Chest pain, angina, and acute coronary syndrome were added because they are often used to identify patients with suspected AMI in emergency departments. Including this broad set of ICD-9-CM codes helps ensure that all patients with suspected AMI are captured. However, a consequence is that some patients who were not being managed as a possible AMI (e.g., chest wall pain) may have been included in the sample, resulting in an underestimation of the rate of patients receiving appropriate assessment and treatment. Of the 500 cases abstracted by the hospitals, 57 were identified by AMI codes and 300 were identified by chest pain codes. Further refinement of the inclusion rules is warranted. These refinements were discussed at the expert panel meeting. The solution may be to keep the broad set of codes for preliminary case identification and to also require documentation in the record that the patient was being managed as a possible AMI.

Though hospitals expressed some concern that the case identification codes seemed too broad (including patients not being treated as suspected AMI), they nonetheless expressed enthusiasm for usefulness of measures in this area. Some have already initiated quality improvement work in this area because of what they learned in the measurement process.

Other than revised case identification, no adaptations were made to two measures for the small rural hospital setting, aspirin within 24 hours of arrival and thrombolytic within 30 minutes of hospital arrival. Two measures of assessment--time to blood draw for cardiac indicators and time to ECG were added. The American Heart Association (AHA)/American College of Cardiology (ACC) guidelines recommend that ECGs be done immediately upon arrival at the hospital. The median time to ECG and the percent of patients whose ECG was done within 10 minutes of hospital arrival are measured. Only 12-lead ECGs were considered for the measure. The AHA/ACC guidelines also recommend that blood be drawn for cardiac enzymes and troponins soon after hospital arrival. The median time to blood draw and percent of patients whose blood was drawn are measured.

Table 7 shows the results for CP/AMI emergency department measures. Eleven of the 22

hospitals gave thrombolytic therapy to at least one AMI patient, and the largest number of patients receiving thrombolytic therapy during the six months was ten. (See Appendix 11: Hospital-Level Data Tables.)

Table 7. Emergency Department Measure: Chest Pain/AMI

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Aspirin within 24 Hours of Arrival	22	59.9%	25-93.8%
Time to ECG (within 10 minutes)	22	50.8%	16.7-83.3%
Time to Blood Draw for Cardiac Indicators (within 10 minutes)	22	15.8%	0-45.8%
Thrombolytics within 30 Minutes of Hospital Arrival	11	33.3%	0-83.3%
Time to Transfer (median in minutes)	22	115 minutes	50-232 minutes

Emergency Department Measure: Pneumonia

Emergency department treatment of pneumonia was measured by the administration of antibiotics within 4 hours of arrival. This measure was adapted from the inpatient pneumonia measure. Emergency department pneumonia patients were counted as receiving treatment if they received antibiotics in the emergency department. Patients admitted to the hospital from the emergency department are captured in the inpatient pneumonia measures. Patients who did not receive an antibiotic in the emergency department were not counted in the denominator of patients. The percent of emergency department pneumonia patients receiving antibiotics within 4 hours and the median time to antibiotic administration are measured.

A confounding variable that must be addressed for this measure is the acuity or severity of the pneumonia. Patients with less severe pneumonia may receive a prescription for an antibiotic with the expectation that it be filled at an outpatient pharmacy. If a patient is less ill, using the outpatient prescription for oral antibiotics is likely appropriate. Limiting this measure to patients who received IV antibiotics in the emergency department is an option to consider. In any event, performance on this measure was uniformly high.

Table 8 shows the results for the pneumonia emergency department measures. (See also Appendix 11: Hospital-Level Data Tables.)

Table 8. Emergency Department Measure: Pneumonia

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Antibiotic within 4 hours	20	97.5%	83.3-100%
Median time to antibiotics	20	83 minutes	30.5-180 minutes

Emergency Department Measures: Trauma Vital Signs

Emergency department trauma processes were measured by hourly monitoring of vital signs. In the first quarter hospital report, two measures were used: the defined number of vital signs that were documented for the patient and the percent of charts that met the trauma hourly-monitoring standard (how many patients had the defined number of vital signs). The definitions and the presentation of these data confused some hospital staff, so in the full 6-month hospital report the only measure reported was the percent of defined vital signs completed.

Table 9 shows the results for trauma monitoring (see also Appendix 11: Hospital-Level Data Tables). Preliminary assessment indicates that the inclusion rule resulted in a heterogeneous group of patients with a wide range of vital sign monitoring needs. For example, serious conditions such as intracranial injury (ICD-9-CM 8850-854) and minor conditions, such as sprains and strains (ICD-9-CM 840-849), were included. Preliminary feedback from hospitals suggests that trauma monitoring needs to be measured by diagnostic groups that have similar monitoring needs. It also may be necessary to consider event history as well as current patient indications when determining the appropriate monitoring levels. These refinements need to be made before this measure can be useful for internal improvement or external reporting.

Table 9. Emergency Department Measure: Trauma Vital Signs

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Regular Monitoring of Vital Signs	22	51.5%	27.3-77.3%

Emergency Department Measure: Transfer Communication

Emergency department transfer communication is reported by means of a summary measure. The summary measure incorporates items of information that should be provided by the referring rural hospital when a patient is transferred to another acute care hospital.

The measure is based on work identifying basic patient information that should be provided on transfer. The Continuity of Care Record (CCR) is a standard transfer communication specification developed jointly by the American Society for Testing and Materials (ASTM) International, the Massachusetts Medical Society (MMS), the Health Information Management and Systems Society (HIMSS), and the American Academy of Family Physicians (AAFP). The CCR identifies a set of basic patient information consisting of the most relevant and timely facts about a patient's condition. It is intended to foster and improve continuity of patient care, to reduce medical errors, and to assure at least a minimum standard of facts or health information transportability when a patient is referred or transferred to, or is otherwise seen by another provider. These facts include patient and provider information, insurance information, patient health status (e.g., allergies, medications, vital signs, diagnoses, and recent procedures), recent care provided, as well as recommendations for future care (care plan) and the reason for referral or transfer. The study measure includes two administrative, six patient identifications, and eight patient care items. No adaptation of the data elements was needed to accommodate the small rural hospital environment.

A scoring or scaling procedure for the individual transfer communication data elements does not exist. In our report to hospitals the measures were reported in four ways: 16 individual measures; scales representing the administrative (0-2), patient identification (0-6), and patient care (0-8) components; average number of elements present (0-16); and the distribution of the percent of charts with scores between 0-16 (i.e., 15% had a score of 12, 25% had a score of 13, etc.). The detailed information available from the individual scoring and component scoring may contribute to internal improvement efforts. The average scores may facilitate external comparisons. Table 10 shows the sum scores for all items for the emergency department transfer communication measure.

The Technical Expert Panel discussed this measure at the meeting (For a summary of their discussion, please see the Methods and Results section titled, "Expert Panel Process and Results.")

Appendix 12 is a document detailing the analytic logic for the Emergency Department transfer tool.

Table 10. Emergency Department Measure: Transfer Communication Measure

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Number of elements sent with transfer patients. Includes administrative communication, patient identification, and patient care elements (Range 0-16)	22	13.2	7.3-15.7

Cross-Cutting Measure: Advance Directives

Cross-cutting measures focus on measuring quality across units (e.g., inpatient, emergency department) and across conditions (e.g., heart failure, pneumonia). This cross-cutting measure assessed advance directive status for inpatients. No adaptation for the small rural hospital environment was needed. The data collection tool provided 4 different response choices: 1) assessed and had the advance directive in the medical record, 2) assessed and had an advance directive but it was not in the medical record, 3) assessed and did not have an advance directive, and 4) was not screened for advance directive. All patients were eligible for the denominator; any assessment (i.e., answers 1-3) was counted in the numerator.

Table 11 shows the results for the advance directive measure. (See also Appendix 11: Hospital-Level Data Tables.)

Table 11. Cross-Cutting Measure: Advance Directives

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Screened for Advance Directives	21	85.7%	44%-100%

Cross-Cutting Measure: Medication Teaching

Medication teaching and understanding of a medication regimen are very important especially for those patients using multiple medications. This cross-cutting measure assessed documentation that patient or their caregiver understood their discharge medication regimen. The data was collected from inpatient and ED medical records. All patients discharged home or discharged with home care that had routine scheduled medications were included in the denominator for this measure. No adaptation for the small rural hospital environment was needed.

Medication teaching and understanding the regimen are usually poorly documented in the medical record. Often healthcare staff document education but do not address patient understanding. Patients are often requested to sign multiple sheets of discharge documents and may not take the time to carefully read them. In this project, criteria for being counted in the numerator were wide – including a printed discharge form signed by the patient indicating understanding of discharge medications. We believe many patients included in the numerator were included for this reason, and that it is difficult to determine the level of understanding of the medication regimen from hospital records. Alternative methods of assessment of understanding need to be explored before this measure is ready for broader testing.

Table 12 shows the results for the medication teaching measure. (See also Appendix 11: Hospital-Level Data Tables.)

Table 12. Cross-Cutting Measure: Medication Teaching

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Medication Teaching	22	86.6%	16.9%-100%

Cross-Cutting Measure: Medication Safety Checklist

The medication safety checklist was a cross-cutting measure assessed by hospital completion of a checklist. The medication safety checklist is a list of recommended medication safety processes compiled for this project using information from The Leapfrog Group, Health Research and Education Trust of the American Hospital Association, Institute of Safe Medication Practices, Stratis Health staff, and University of Minnesota Rural Health Research Center staff. The presence of these safety processes was collected from the hospitals in the form of a checklist (see Appendix 8: Medication Safety Checklist).

The list of processes assessed was organized by the point of medication distribution influenced by the process: pharmacy expertise availability (pharmacist hours per week; pharmacy technician hours per week; pharmacist educational level (BS vs. PharmD)); medication and patient information availability to pharmacy staff, physician staff, and nursing staff (medication information; co-morbidities; allergies; laboratory values; medication history; herbal and over-the-counter (OTC) medication history); storage and purchasing safety mechanisms in place (high-alert medication labeling/storage process; look-alike medication labeling/storage process; pre-mixed or pharmacist mixed IV fluids only; unit dose capability); medication delivery safety processes in place (allergy lockout; automated medication dispensing; anti-coagulation monitoring; IV insulin protocol; subcutaneous insulin protocol; computer/pharmacist-generated medication administration record (MAR); infusion device standardization; free-flow protection in infusion pumps; patient identification system); other medication safety processes (supportive reporting environment is provided; medication safety project in process; screening process in place for events or near misses; review process is in place for screening results; action plan is in place for results of the review process). No adaptation was needed to accommodate the small rural hospital environment.

A scoring metric is not readily apparent for the medication safety checklist because not all the processes have an identified standard.

Table 13 shows the total sample results for the medication safety checklist.

Table 13. Cross-Cutting Measures—Medication Safety Checklist

Data Collected	All Reporting Hospitals (n=22)	Range Across Hospitals
Pharmacy expertise availability	Mean	
Pharmacist hours per week	30.6 hours	2-67 hours
Pharmacy Tech hours per week	24.3 hours	0-70 hours
Have a PharmD	50.0%	Yes/No
Medication and patient information availability	Mean of 6 possible elements of information	
Number of information elements that are available in paper form for:	Pharmacist 5.3	0-6
	Physician 5.8	5-6
	Nurse 5.6	1-5
Number of information elements that are available in electronic form for:	Pharmacist 2.2	0-6
	Physician 2.0	0-6
	Nurse 2.1	0-6
Storage and purchasing safety	Percent that have these	
High alert labeling and storage process in place	59.1%	Yes/No
Look-a-like labeling and storage process in place	42.9%	Yes/No
Pre-mixed or pharmacist-mixed only IV fluids	27.3%	Yes/No
Unit dose capacity	81.8%	Yes/No
Delivery safety processes in place	Percent that have these	
Allergy lockout system in place	14.3%	Yes/No
Automated dispensing available	22.7%	Yes/No
Anti-coagulation monitoring protocol in place	77.3%	Yes/No
Insulin protocol in place	40.9%	Yes/No
Computer or pharmacist generated MAR only	40.9%	Yes/No
Hospital-wide IV device standardization	95.5%	Yes/No
IV devices have free-flow protection system	95.2%	Yes/No
Hospital-wide patient identification system in place	13.6%	Yes/No
Other Medication Safety Processes	Mean	
Supportive Reporting Environment (1-5 Likert Scale where 5 is very supportive)	4.3	3-5
	Percent that have these	
Medication safety project in process	86.4%	Yes/No
Safety screen system in place	38.1%	Yes/No
Safety screen review system in place	60.0%	Yes/No
Safety screen review action plan in place	66.7%	Yes/No

Administrative Measures: Cesarean Section and Laparoscopic Cholecystectomy

Measures based on administrative data included Cesarean section rate and laparoscopic cholecystectomy rate. No adaptations were made to either measure to accommodate the small rural hospital environment. Hospitals that provided obstetrical services collected data for the obstetric administrative measure. Risk adjustment will be important for this measure as small rural hospitals may refer complex maternity cases early in the pregnancy to providers outside of the community.

Prior to assignment of measures, each hospital was asked what types of surgical services they provided. Hospitals that performed laparoscopic cholecystectomies collected the administrative data for the cholecystectomy measure. There was little rate variation across the participating hospitals. Risk adjustment also will be important for this measure as small rural hospitals may refer complex cholecystectomy cases to providers outside of the community.

Table 14 shows the results for the C-section and laparoscopic cholecystectomy measures.

Table 14. Administrative Measures: C-Section and Laparoscopic Cholecystectomy

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
C-section Rate	10	25.5%	13.8-64.3%
Laparoscopic Cholecystectomy Rate	7	86.7%	85.7-100%

Administrative Measures: Adverse Drug Reactions and Medication Errors

Measures of administrative processes used to manage pharmaceutical outcomes are adverse drug reactions and medication errors. For both measures, hospitals used their own measure definition and measurement process because there are not generally accepted standards. Hospitals varied in their capability to collect this data. For both of these measures, hospital specific definitions and measurement processes are useful for internal quality improvement if the measures are carefully defined and systematically collected. However, the variability across hospitals in measure definition and measurement processes does not allow for comparison across hospitals. If these measures are used for external comparison purposes, standardized definitions and processes need to be developed.

For this study, hospitals were asked to report their medication error rates and to describe the method of detection of medication errors that is being used. Possible sources for these data are incident reports, variance reports, risk management data collections forms, quality management forms, or pharmacy data collection forms. No adaptations to the measure were necessary to accommodate the small rural hospital environment. In the final survey the hospitals described the method they use internally to collect data on adverse drug events and medication errors.

Table 15 shows the adverse drug reaction and medication error measures.

Table 15. Administrative Measures: Adverse Drug Reactions and Medication Errors

Measure	# of Hospitals Reporting	Total Sample Results	Hospital Range
Adverse Drug Reaction Rate	8	0.6%	0-3.7%
Medication Error Rate	10	0.11%	0.02-.70%

Administrative Measure: Medicaid Denials

This measure assesses administrative claims processes within hospitals by measuring the ability of the hospital to respond to state Medicaid requirements. Variation in state Medicaid admission approval processes does not allow for comparisons across states. This measure may be useful in some states but there is not an opportunity for broader national comparisons.

Table 16 shows the Medicaid denial rate measure.

Table 16. Administrative Measure: Medicaid Denial

Measure	# Hospitals Reporting	Total Sample Results	Range Across Hospitals
Medicaid Denial Rate	3	1.01%	0-1.04%

Hospital Surveys and Feedback

Methods

Pre-training, mid-study, and post-collection surveys were used to obtain feedback from hospitals on the overall project with particular interest in the measurement process. In addition, feedback was solicited and received from hospital staff throughout the project.

In the pre-training survey, a University of Minnesota staff contacted all hospitals identified by the QIO staff as potential participants. In most cases the contact person for the hospital was identified by the QIO. Contact persons included Chief Executive Officers, Directors of Nursing, Quality Risk Managers, and Health Information Directors. The survey consisted of questions about their hospital's current quality program and their expectations with respect to the field study.

In the mid-study survey, the QIO staff interviewed the contact person at each hospital that completed the first quarter of data collection. The survey assessed the initial reactions of the hospital staff to the measures, the data collection tools and process, and the first quarter data summary report of the data.

In the post-collection survey, all hospitals (n= 22) that completed six months of data collection were surveyed by the University of Minnesota staff to document reactions to the measures, the data collection tools, and the reporting process. The purpose of the final survey was to evaluate the usefulness and ease of data collection of the measures for the rural hospitals. It also requested feedback on the reporting processes used by the QIOs. This survey was completed approximately two months after the hospitals received their six-month report (March/April 2005).

Results: Pre-Training Survey

For the pre-training survey, 28 of 29 hospitals completed the survey for a 97% response rate (see Appendix 13: Pre-Training Survey). Six hospitals, whose staff completed the survey, subsequently dropped out of the project due to resource limitations. Almost all of the surveys were completed in a 10-15 minute phone interview. Three of the surveys were completed at the training session in Utah.

The pre-training survey provided the following information:

1. Most Important Quality Issue for Hospital.

When asked what the most important quality issue was for their hospital, thirteen respondents identified patient safety or medication error and management. Another six respondents identified patient satisfaction as their quality target area.

2. Most Important Issue With Respect to Quality Measurement.

The most important issue with respect to quality measurement was limited time for nine respondents, followed by understanding measurement, and documentation for three respondents each.

3. Benefits of Participation in This Project for Your Hospital.

When asked about the benefits expected from participation in the study, nineteen hospitals expected more appropriate rural measures, fifteen hoped for a quality of care improvement in their hospital, fourteen expected improved data collection techniques and thirteen hoped for

more appropriate benchmarking. Few expected benefit in the areas of publicity, consumer, or purchaser data use.

4. Current Data Collection.

Nearly 90% of the hospitals reported collecting data on clinical outcomes, patient safety and patient satisfaction prior to the study. Approximately 70% reported collecting data on clinical guideline adherence.

5. Chart Review for Quality Measurement.

Most responders reported good to excellent expertise in current quality data collection efforts using full-time or part-time hospital employees in monthly or more frequent chart review for data collection (mean=3.2 out of 5). Few hospitals had computer support in those efforts (18%).

6. Survey or Administrative Data for Quality Measurement.

The majority of hospitals reported using surveys (85%) or administrative (67%) data for quality data collection. Most survey and administrative data work was completed by hospital personnel; however, survey work was the type of data collection most likely to be outsourced (18%). Expertise in the use of administrative data also was highly rated (mean = 3.2 out of 5) with survey expertise similarly rated with a mean of 3.2. Few hospitals reported computer support of survey data (30%) and eleven hospitals reported computer support for administrative data collection and use. Survey and administrative data collection was conducted slightly less often than chart review. The median frequency was monthly for both administrative and survey data collection, while chart review was more likely to be completed weekly or more frequently.

7. Frequency of Use of Quality Measures.

The frequency of the use of quality data for specific purposes showed some variation. The overwhelming use was for internal improvement while less than 30% of the hospitals used the data often or most of the time for report cards or publicity. Over seventy percent of responders reported using quality data often or most of the time for internal improvement efforts related to identifying patient safety issues and potential interventions. Over fifty percent of responders used the data to measure variation in patient outcomes and to identify diagnostic areas for improvement.

8. Organization of Quality Measurement.

Most hospitals reported a longstanding (mean 7.1 years) centralized organizational structure for quality measurement involving at least one standing committee with monthly or quarterly meetings. These standing committees most often included nurses, administration, and department leadership, as well as, physicians. Community representatives were included as committee members one third of the time.

9. Participation in National Quality Measurement Efforts.

Less than half of the hospitals are JCAHO accredited and some also report using the JCAHO standards for their own quality improvement activities. Twenty-six of twenty-seven respondents report planning to participate in the CMS and AHA voluntary measurement reporting process.

10. External Assistance for Quality Improvement Measurement Activities.

Over sixty percent of the hospitals report getting assistance with QI activities from external organizations such as their affiliated system, their QIO, private vendors or a grant. This

assistance consisted of consultation, training, report production, data analysis, computer software or hardware, or computer programming support.

In summary, most of the participating rural hospitals have active quality-related data collection programs. Data collection is focused on clinical data and clinical improvement rather than on the external reporting of data. Participation in the data collection and improvement efforts reach into most departments, though physician involvement is not universal. Time and resource constraints and staff education may limit data collection, yet hospitals are optimistic about the benefits, (such as quality measures sensitive to rural environments, improved clinical outcomes and better benchmarking opportunities) from participation in this project.

Results: Mid-Study Survey

Seventeen of the twenty-two hospitals participated in the mid-study survey, which was conducted via telephone calls by QIO staff. The purpose of the survey (see Appendix 14: Mid-Project Survey) was to elicit feedback from hospitals regarding the ease of data collection and early thoughts on usefulness within their facility of the quality measurements.

1. Ease of data collection for chart review measures.

Over 90% of the respondents found the data collection for chart review measures to be easy or very easy to conduct, with 50% finding it very easy. One respondent reported identification of cases to be difficult. While the data abstraction tools and help documents were explicit and user friendly, some respondents commented that they had difficulty finding charts or getting needed information from them. Specific difficulties mentioned included the surgical infection prevention (SIP) measures were more difficult to abstract due to the complexity of reviewing all antibiotics administered, emergency department (ED) and trauma code selection criteria was too broad, transfer communication was not always documented and, therefore, could not be collected. Some respondents felt there should have been an “unknown” option on some measures, such as trauma.

2. Ease of data collection for administrative measures.

Over 90% of respondents felt that data collection for administrative issues was easy to very easy. One respondent found data collection to be very difficult and similarly reported case identification and finding data elements as difficult. This same respondent found identification of cases difficult for chart review measures (as noted above). Learning to abstract data was critical to successful data collection. Respondents most frequently mentioned that data depicting the number of medication errors and the number of medication doses dispensed within the organization was not readily available or not always reported. Respondents reported that administrative data required more time to abstract, as existing processes within the organization did not support data collection for the measure. Medicaid data was also problematic in that it was not available in system reports.

3. Usefulness, importance and ease of data collection for ED (e.g., trauma monitoring, AMI triage) and Continuity of Care (e.g., communication with tertiary hospital) related to rural hospital quality.

Respondents felt the ED measures were important due to volume, however, comments reflected that some measures were not appropriate or needed refinement. For example, the vital signs for trauma patients and the chest pain/AMI measures seemed, to some respondents, to use too broad a range of codes for case identification. Additionally, the ED data was often time consuming to collect and at times documentation was lacking. Overall, respondents valued the measures and felt they would be useful in making improvements. Some hospitals relate that they have already begun to use the transfer data to begin quality improvement initiatives in this area.

4. Nature and quality of support for project outside of participating hospitals and additional help that might have been useful.

Participating hospitals received a variety of outside support during the course of the project. All respondents were supported by a QIO in the project and at least two were also supported by an affiliated system. Two hospitals were supported by another hospital and two were supported by a vendor. Comments reflected that QIO support on the project was sufficient and additional help was not needed. All respondents felt the technical assistance and training was helpful or extremely helpful (78% and 90%, respectively). A majority of respondents felt assistance with

computer hardware/software and programming support, data analysis and report production was helpful to extremely helpful (60-75%).

5. Nature and quality of support for project from within participating hospitals and additional help that might have been useful.

All but two respondents were supported internally on the project through an administrator and/or director of nursing. The other two were supported by a risk manager, surgery manager, OB manager, or special projects coordinator. Some respondents did not feel they needed more support from staff, but those who did would have liked additional support from hospital staff for data collection, abstraction, records review, reports, data system ability to track Medicaid and more nursing staff cooperation.

6. Recommendations for other small rural hospitals that are interested in quality measurement.

Respondents generally would recommend participation in rural hospital measures, finding them beneficial for tracking and benchmarking and a good learning experience. Advice for successful participation included: having a tracking system and ability to pull records and collect data efficiently; sufficient support staff; physician buy-in; support of other departments; and clarity around the purpose of the project and related efforts.

7. Additional comments on reports.

Respondents appreciated the reports and felt they were helpful and easy to understand. Comparison information with like-sized hospitals was helpful. Any feedback for change was specific and minor, but overall, respondents felt the reports would provide an excellent basis for organizational quality improvement.

Results: Hospital Staff Feedback

Hospital staff feedback during the study identified internal improvement opportunities and internal systematic challenges, as well as, opportunities for training improvement and measure clarification. Measurement changes were suggested for seven of the measures.

Emergency Department Pneumonia

Antibiotic treatment practice in the ED for pneumonia varies by severity of the respiratory symptoms at presentation to the ED and by availability of outpatient pharmacies in the community. Some ED pneumonia patients may receive the initial antibiotic dose at the ED and some may be sent with a prescription to be filled at an outside pharmacy. The measure may need to be modified to account for cases that received a prescription to be filled elsewhere or to simply limit the measure to patients who received IV antibiotics.

Emergency Department Chest Pain/AMI

Much discussion involved the ED chest pain/AMI measure. One suggestion addresses the need to clarify coding or require a presumptive diagnosis of AMI prior to inclusion in the denominator. By limiting the measure to only those documented as “possible AMI” or “probable AMI”, a better indication of quality of care will be achieved. Additionally, one quality director suggested the measure needs to be revised as care standards change. Specifically, in AMI the use of thrombolytics has decreased. Patients are more frequently transferred to a tertiary hospital for percutaneous coronary intervention, rather than thrombolytic treatment administered at the local rural hospital.

Emergency Department Trauma

Many participants expressed concern about the design of the trauma vital sign measure. A severity/acuity indicator is needed to determine the appropriate monitoring for ED trauma patients. This measure as currently defined, is a one-size-fits-all measure that provides limited information for internal improvement or for external reporting.

Transfer Communication Tool

The transfer communication tool was useful for many hospital staff and already has generated some improvement projects. One area of concern is that within health systems, information may not be included in the hard copy transfer because of electronic medical record links between affiliated hospitals. Information transferred electronically contributes to continuity of care and must be included in the measure to clearly represent the level of communication provided.

Adverse Drug Events and Medication Errors

Measurement of adverse drug events and medication errors provided many challenges for the study hospitals. The wide range of definitions, processes, documentation, interpretation of documentation, and denominator definitions challenge the external reporting value of these measures. For internal improvement, consistency of definition and clarity of process may assist with identification of improvement opportunities in the medication safety area.

Resource Issues

Staffing challenges are not unique to small rural hospitals but their impact on quality projects is intensified in this setting. Overall, limited resources accentuated the need to coordinate the various quality project deadlines in the pipeline. At the beginning of the study many hospitals were also attempting to meet requirements to use the CMS Abstraction and Reporting Tool

(CART). The diversion from either effort resulted in frustration and disappointment on the hospital staff's part.

Internal and External Systems

Systems internal and external to the rural hospital provided additional roadblocks for study personnel. Staff changes, incomplete internal communication, and unfamiliarity with internal staffing capabilities provided challenges to many hospital personnel. One quality improvement staff was not aware of their hospital's capabilities in using billing systems to identify cases; another hospital's documentation inconsistencies increased the time required for abstraction. Staffing changes over the 9-month period also necessitated multiple training sessions at several hospitals. Several larger hospital systems were reluctant to allow variation from their system's quality program so that hospitals could participate in the feasibility test. Despite attempts by the QIO staff to ease concerns, several hospitals were unable to participate due to system constraints. As more small hospitals are linked through affiliations or ownership relationships, this challenge must be addressed to facilitate widespread participation in quality measurement activities.

Staff Capabilities

The feedback clearly indicates a wide range of data abstraction capabilities at small rural hospitals. An assessment of past abstraction activities and the provision of additional training for hospitals unfamiliar with the abstraction process are important when planning future similar activities with small rural hospitals. Training staff need to be aware of jargon to ensure understanding. One possible option is to abstract a chart before and after the training to identify staff that need additional support.

Successes

Some successes were also noted in the feedback. The similarity of tools to other projects was appreciated. The time commitment for some participants was manageable due to the small volume of cases. The reports sent to the hospitals with first quarter data were appreciated. Hospital staff expects to use the information for internal quality improvement projects.

Results: Post-Collection Survey

In March and April 2005 twenty of 22 hospital quality directors were interviewed for 15 to 20 minutes, approximately six to eight weeks after they had received the hospital reports with two quarters worth of data. During this interview, questions were asked about the usefulness and the ease of data collection of the measures, benefits of their participation in the project, and the contribution the reports made to their quality program. In addition, the hospitals were asked about the quality of their ED documentation, definitions, and methods of data collection their hospital used for medication error reporting, adverse drug event reporting, and medication teaching documentation. (See Appendix 15: Post-Collection Survey and Results.)

The main findings from the post data collection survey showed that this project was viewed as feasible and useful for these small rural hospitals and led to actionable items related to quality improvement. The findings included:

- On a scale where 1 is very difficult and 5 is very easy, respondents rated the ease of data collection as greater than 4 on all chart abstraction measures.
- Data collection for the C-section and laparoscopic cholecystectomy rates were also rated over 4.
- The administrative measures of Medicaid denial rates, medication errors, and adverse drug events were all rated as equal or less than 4 (3.0, 3.45, and 4.0 respectively).

The QIO training and support model prepared the hospitals for their participation in the project. Several of the hospitals' quality directors expressed interest in continuing the data collection and many had initiated one or more internal improvement projects based on the findings from their data collection. One hospital will be using the data for their Baldrige Award application. Many hospitals expressed an interest in a longer reporting period (greater than six months) in order to produce a larger more meaningful sample.

The measurement areas were considered a good starting point, and overlap with current projects was appreciated. At first, several hospitals felt that case identification was a challenge. Several hospital respondents suggested that more common conditions be addressed in measurement. Some of the areas suggested include emergency department management of sore throat or gastroenteritis, and surgical management of appendectomy or hernia repair.

Most hospitals found the targeted improvement area useful, and many respondents have incorporated several of the measurements into their quality improvement work.

Their ratings of the usefulness of the measures for internal or external improvement reflect their interest, workloads, and their improvement areas. Hospitals rated these measures on a scale where 1 is not useful and 5 is extremely useful. The results included:

- Most areas were rated higher than 3 for internal and/or external usefulness, including the ED CP/AMI, ED pneumonia, and transfer communication measures, and all three inpatient measurement areas: HF, SIP and Pneumonia.
- Several areas were rated as greater than 3 for internal improvement but less than three for external improvement, including: trauma vital signs, medication safety checklist, medication error rate, advance directive screening and medication teaching.

- C-section rate was rated higher than 3 for external reporting but less than three for internal improvement.
- Two measurement areas, laparoscopic cholecystectomy rate, adverse drug reaction rates, were rated less than three for both internal and external usefulness.

Table of results

The scale used to interview the hospital for usefulness for internal improvement, usefulness for external improvement, and ease of data collection was a scale from one to 5 with 1 being not useful at all or very difficult and 5 being very useful or not difficult. The results for each topic are listed in Table 17.

Table 17. Ratings of Measures by Study’s Rural Hospitals

Measurement area	Usefulness for internal improvement	Usefulness for external improvement	Ease of data collection
Inpatient HF	4.5	3.7	4.38
Inpatient Pneumonia	3.8	3.8	4.5
Inpatient SIP	3.7	3.8	4.0
Ed CP/AMI	4.5	3.8	4.6
ED Pneumonia	3.8	3.6	4.6
ED Trauma	3.2	2.4	4.1
Transfer Communication	4.1	3.3	4.1
Advance Directives	3.1	2.6	4.6
Medication Teaching	3.2	2.7	4.3
Medication Safety Checklist	3.3	2.9	4.3
Medication Errors	3.7	2.8	3.5
Adverse Drug Reactions	2.7	2.6	4.0
C-sections	2.6	3.1	4.6
Laparoscopic cholecystectomy	2.0	2.1	4.9
Medicaid Denials	1.3	1.3	3.0

The new topic areas for the emergency department and medication safety measures provided valuable opportunities to examine important aspects of clinical care. The four areas most frequently targeted by these hospitals for improvement following the data collection were: 1) Emergency Department Chest Pain/ AMI, 2) Emergency Department documentation, 3) transfer communication, and 4) medication safety areas. Most hospitals had already taken action on the findings from the hospital reports. Specific examples of improvement activities included:

- Implementation of rapid transfer program for presumed AMI with tertiary hospital
- Reset ECG time stamp

- Revisions made to discharge, transfer, and medication teaching documentation forms
- Staff education on documentation
- Development of standing orders for various diagnostic areas
- MD led SIP improvement project in development
- Pastoral care led advanced directives improvement project in development
- Increasing hours of pharmacist coverage through various means and technology, including telepharmacy and contracting for consulting services with an affiliated hospital.
- Exploring ways to transfer LVF information from outpatient or old hospital records to current hospital stay record
- Incorporation of ED measures into performance guidelines
- Considering implementation of 'T' guideline system for emergency department

The participants made suggestions for changes to the other quality measures included in this study and other recommendations, which are listed below.

- Several respondents felt that the inclusion codes for the emergency management of chest pain/AMI were too broad. An additional exclusion step identifying the patients as 'presumed AMI' or 'suspected cardiac event' prior to their inclusion in the denominator for the treatment measures of ASA, thrombolytics, and transfer was suggested to limit the denominators to those eligible for the treatment. It was felt that the two blood draw questions were redundant since they were reported together. These other quality measurement areas were considered a great start and respondents stated that they believed these areas contributed to previous work in this area.
- The ED management of pneumonia would have provided more information in the fall or winter months given the seasonality of the disease. One concern was that many ED pneumonia patients were given a prescription to be filled elsewhere if their condition was deemed to be less severe. A possible solution included a determination of the severity of the patient's condition, (by using an O₂ saturation cut-off point) to identify an indication for ED administration of the first dose of antibiotics.
- The ED trauma monitoring measure provided valuable information with respect to the documentation of vital signs in the ER. Because of the broad codes used to identify the sample it did not identify inadequate monitoring as much as simple documentation lapses. To improve the measure the respondents suggest stratifying the sample to group patients with similar monitoring needs.
- According to hospital staff, the transfer communication tool is too long, yet eye-opening. Many improvement projects already started involved training and form changes to better document the communication between the emergency department and the receiving tertiary hospitals.

- Several measures using administrative data were collected in this study. Two procedure rates, Cesarean section rates and laparoscopic cholecystectomy rates, were collected. It was suggested that the C-section rates should be separated into primary and repeat C-sections. Because care for pregnancies with expected complications may be transferred prior to delivery, a risk adjustment should be applied before the use of these measures for external comparisons. Similarly, cholecystectomy patients with expected complications may be transferred for their procedure to a tertiary hospital necessitating a risk adjustment prior to comparison of this rate.
- One measure of administrative processes was included in the project (i.e., the rate of Medicaid denials). Three hospitals reported this measure and they reported difficulty getting information from their business office. The approval process for Medicaid hospital admissions varies from state to state resulting in a measure that is not comparable across states. This measure was not useful for small rural hospitals at this time.
- Hospitals believe that medication safety is an important area of quality given the national environment. Information related to medication safety was collected by the hospitals in two ways. Medication error rates and adverse drug reaction rates were reported using administrative data. A survey of medication safety practices in place was collected. Most hospitals reported using an incident report system for tabulating medication errors and adverse drug events. Hospitals used the “wrong patient, wrong time, wrong dose, wrong medication, etc.” standard for identification of an error. Standard application and reporting processes are needed prior to external comparison of findings. Many hospitals were unable to determine the number of doses dispensed or administered in the given time frame to be used for the denominator. Although there was not a clear understanding of how to use these tools either as measures or for quality improvement, several hospitals took action to address missing components of safety as identified by the medication safety checklist. Some examples include: discussing the need for insulin and/or heparin with medical staff, exploring computer support for pharmacy allergy lock-outs and computer-generated medication administration record.
- The respondents felt that the opportunity to benchmark with similar hospitals was of great benefit as well as the opportunity to identify improvement areas. Networking was useful and the respondents would appreciate more opportunities to share quality practices. The opportunity to use more appropriate rural measures was beneficial. Little benefit or use was seen in the areas of public relations or customer or purchaser use. The cooperation between the study partners, (QIOs, the University of Minnesota, and CMS), was viewed as providing synergistic support for small rural hospitals.
- The hospital data report was used for a variety of purposes. Hospitals found it valuable in the identification of diagnostic areas for improvement, variation in clinical practice, and patient safety issues. The report also provided ideas for potential quality interventions. A few hospitals used the reports to quantify variation in administrative practices or in patient outcomes. They did not use the report for reporting or publicity purposes.
- The quality directors were very satisfied with the support received from the QIOs. The response time was reported as short and the expertise as valuable. Respondents reported

few problems with data collection. The training was an excellent opportunity to network and the opportunity to practice on real charts was appreciated. Inter-rater reliability auditing activities and follow-up were reassuring to the hospital auditors. A follow-up meeting to better understand and share improvement strategies would have been beneficial.

Expert Panel Process and Results

Note: The section, “Expert Panel Process and Results, consists of two sections: ‘Technical Expert Panel Overview’ and ‘Summary of Discussion at Expert Panel Meeting.’

Technical Expert Panel Overview

The Technical Expert Panel, comprised of national experts in rural health, was convened to review the findings of the field test and provide input about the inclusion of specific measures in a revised set of quality measures relevant for rural hospitals. The recommendations of the expert panel, as well as the experience of the rural hospitals participating in the field test, will inform policymakers and program developers about the feasibility for small rural hospitals to collect and use the rural-relevant measures.

It was the consensus of the Rural Health Special Study team to build the expert panel from a number of members from national expert panel that made the original measurement recommendations. The original panel included representatives from the rural physician, hospital, nursing, and pharmacy communities; JCAHO; National Quality Foundation; Leapfrog Group, Agency for Healthcare Research and Quality (AHRQ); Office of Rural Health Policy (ORHP); QIOs; and purchaser coalitions. Eight of the original panel were invited to participate. The additional invitees to the expanded panel included hospital participants from the current special study, ER experts, a consultant who has worked closely with the development of the Continuity of Care record (CCR), an expert in rural health policy, the American Academy of Family Physicians, American Hospital Association, and an expert in medication safety and medication errors. CMS staff was also invited as observers, as well as a representative from Qualis Health because of their work on an emergency department CMS Special Study.

Technical Expert Panel members were recruited by individual phone calls by University of Minnesota and Stratis Health staff.

(Appendix 16 includes the Technical Expert Panel members and biographies.)

A packet of information was sent to each member March 2005 that included the following items. (Please see Appendix 17 for the cover letter and scoring form for new measures.)

- Body of the final CMS report for Phase I of the “Refining and Field testing a Relevant Set of Quality Measures for Rural Hospitals”
- Data report (January 2005) sent to hospitals who field tested the measures
- Measurement specifications
- De-identified hospital-level results for inpatient measures and emergency department measures
- Rating scale for new rural measures to be completed and returned prior to the meeting
- A listing of the four “measure readiness” categories panel members were asked to consider during discussion of the measures at the meeting.

The Technical Expert Panel convened at Stratis Health’s office in Bloomington, Minnesota, on April 7 and 8, 2005. All 16 expert panel members were in attendance, as were three observers,

including the CMS Government Task Lead, Edwin Huff. The observers were not included in the final voting process for each measure; however, they offered expertise and shared their knowledge of rural health. (The agenda for the day and a half meeting is included in Appendix 18.) The day began with a welcome, overview of the goals for the meeting, and introductions. The preliminary results from the final survey of rural hospitals were then presented to the expert panel. Box lunches were provided for the group.

Each panel member was given a three-ring binder with tabs dividing the materials to be used during the meeting. A section for each measure (or set of related measures) contained measurement specifications, aggregate hospital results, and for inpatient and emergency department measures the de-identified hospital level results. Additional analyses performed for the AMI/chest pain measures were also provided and are included (see Appendix 19). Panel members were also provided with a “Measurement Readiness Ranking” form that was used throughout the meeting. The measurement readiness categories were: 1) can be used for comparative measurement as is or with minimal modifications, 2) will need changes and additional testing in order to be used for comparative measurement, but the general approach seems appropriate, 3) important subject for comparative measurement, but needs a new measurement approach, or 4) not an important subject for comparative measurement (example reason: uniformly high results).

Following the introductory presentations and discussions, the majority of the meeting focused on the individual measurements. To start consideration of a measurement, a member of the study team gave an overview of the measurement specifications, feedback from hospitals on feasibility and usefulness, inter-rater reliability, and measurement results. Panel members then drew on this information and their own knowledge and experience to engage in discussing how ready the measurement was for use. Each panel member privately put the measurement into one of the four categories on the “Measurement Readiness Ranking” form after each measurement discussion concluded.

Near the meeting’s end, the “Measurement Readiness Ranking Forms” were collected from panel members and the results were tallied and shared with the group. During the ‘Final Categorization of Measures’ agenda item, the panel, after reviewing the tally results, chose a few measurements to discuss further. Additional discussions addressed if smoking assessment and counseling should be done for all inpatients, whether advance directives as a compliance issue should be included, if medication teaching could begin with a diagnosis (i.e., heart failure) or a class of drugs (i.e., lithium), and further discussion on Emergency Department chest pain and AMI measures. Panel members then had a final chance to adjust their categorization if they chose to do so. The final ‘Expert Panel Measure Readiness Ranking’ results appear in Appendix 20.) Some caution must be used in interpreting these rankings. The line that divides categories is not absolutely clear, and comments written in the rating forms indicates somewhat different approaches to interpreting the categories. Use of the ‘Readiness Ranking Forms’ served its process role admirably, but refinement of instructions for applying the ratings is needed to make the numerical results unambiguous.

Throughout the meeting, when ideas for additional, new measurements were brought up, they were captured on a flip chart. On the afternoon of April 8 these ideas were reviewed and additional time was spent brainstorming further ideas for new measurements. The ideas are documented in the ‘Summary of Discussion at Expert Panel Meeting’ section below.

Before the meeting closed, approximately 45 minutes were spent discussing what actions are necessary for small rural hospitals to integrate quality measurements into their daily operations. Highlights of this discussion are also documented in the ‘Summary of Discussion at Expert Panel Meeting’ section below.

Summary of Discussion at Expert Panel Meeting

Inpatient: Heart Failure

Panel readiness assessment:

There was strong support for these measures derived from the then-current version (2003) of JCAHO and CMS measures. The panel shared some concerns and suggestions regarding the measures.

Concerns and comments:

- Inclusion of angiotensin receptor blockers (ARBs) should be consistent with the revised CMS/JCAHO ‘ACEI for LVSD’ measure, which makes an accommodation for the role of ARBs.
- In some geographic regions (example: Montana), there are issues of access to technology for left ventricular assessment.
- There was validation for making the revision from the CMS/JCAHO measure so that patients transferred to swing bed status prior to discharge were retained in the measure.
- It was felt that the ‘Adult Smoking Cessation Advice/Counseling’ measure could be appropriately applied to all patients, not just the convenience sample of pneumonia and heart failure patients as done in the field test.
- Because multiple disciplines can provide the types of discharge education called for in the ‘Discharge Instructions’ measure, it is important that abstractors look carefully through the full record to give maximum credit for documented care. The field test’s abstraction instructions allowed documentation anywhere in the record, but it is time-consuming to look through the whole record.
- In some cases the issue in the ‘ACEI for LVSD’ measure is simply inadequate documentation: for example, LV function assessed recently but not documented in hospital record. However, sub-par performance on the measure cannot be dismissed as only a matter of documentation. A study of rural hospitals in Montana showed the issue was a combination of not documenting what had in fact been done and the assessments not having been done. This measure is an example of the need for outpatient care and documentation to be coordinated with inpatient care and documentation.
- There was some discussion of whether the limitation for the ACE inhibitor measure to patients with LVEF less than 40% could be dropped. This was suggested because of some evidence that ACE inhibitors can be useful for persons with LVEF greater than 40%. Others on the panel thought such a change was not yet supported by current scientific evidence.
- There was support for a composite measure: whether a patient ‘passed’ all measures relevant to him or her.

Suggestions for improving the measure:

- Revise the ‘ACEI for LVSD’ measure to be consistent with revisions to the CMS/JCAHO measure, which makes an accommodation for the role of ARBs.
- The ‘Adult Smoking Cessation Advice/Counseling’ measure should be applied to all admitted patients.
- Present the ‘Adult Smoking Cessation Advice/Counseling’ measure in tandem with community-based measures of smoking prevalence and smoking cessation resources.
- The problem of small denominators for the ‘ACEI for LVSD’ will be improved as the ‘LVF Assessment’ measure improves, since patients with no LV function assessment are dropped from the denominator for the ‘ACEI for LVSD’ measure.
- Consider developing a patient-level composite measure, indicating whether a patient ‘passed’ each measure relevant to him or her.

Inpatient: Pneumonia

Panel readiness assessment:

There was strong support for these measures derived from the then-current version (2003) of JCAHO and CMS hospital measures. The one measure where there was substantial discussion was “Oxygenation Assessment.” The panel shared some concerns and suggestions regarding the measures.

Concerns and comments:

- Need to exclude patients under age 18 to be consistent with parallel CMS/JCAHO measures (and because of high prevalence of viral versus bacterial pneumonia in patients under 18).
- It was felt that the ‘Adult Smoking Cessation Advice/Counseling’ measure could be appropriately applied to all patients, not just the convenience sample of pneumonia and heart failure patients as done in the field test.
- For communities and regions with low prevalence of smoking, the ‘Adult Smoking Cessation Advice/Counseling’ measure is likely to produce very small denominators (documented smokers). In these cases, the measure doesn’t seem worth the effort, and concern was expressed about how the public would interpret results with very small numbers.
- There were mixed opinions on the oxygenation measure. Though a few suggested it was not useful as a quality measure due to uniformly high performance, most favored its continued use. With regard to public reporting, there was concern that using only measures where there is substantial room for improvement creates a biased picture of health care quality. With regard to internal quality management, use of the measure could help assure continued high performance through monitoring of the process. Any measurement requires use of staff resources, and the committee was uncertain as to the worth of the effort for this measure.
- It was suggested the oxygenation measurement standard reflect the clinical usefulness of oxygenation assessment earlier than 24 hours into hospitalization. “Oxygenation

assessed within 30 minutes of arrival” was a suggested revision. Others in the group raised the question of whether there was scientific basis for better outcomes based on timely oxygenation assessment.

- There was support for a composite measure: whether a patient ‘passed’ all measures relevant to him or her.

Suggestions for improving the measure:

- Revise pneumonia measures to exclude patients under age 18.
- The ‘Adult Smoking Cessation Advice/Counseling’ measure should be applied to all admitted patients.
- Present the ‘Adult Smoking Cessation Advice/Counseling’ measure in tandem with community-based measures of smoking prevalence and smoking cessation resources.
- Consider revising the measure to shorten the timeframe for documentation of oxygenation assessment: possibly to 30 minutes after arrival at hospital?
- Consider developing a patient-level composite measure, indicating whether a patient ‘passed’ each measure relevant to him or her.

Inpatient: Surgical Infection Prevention

Panel readiness assessment:

There was strong support for these measures derived from the 2003 version of the CMS hospital measures. Even if case volume is too small for valid public reporting, results on these measures could be very helpful for small rural hospitals to use in discussions with their surgeon(s). The panel shared some concerns and suggestions regarding the measures.

Concerns and comments:

- Care needs to be taken in comparing hospital performance on these measures. National results show performance is lower for some types of surgery (notably, colon surgery). If, as some on the panel believe, these types of procedures make up a larger share of surgical volume at small rural hospitals than at large hospitals, then overall hospital performance may tend to be lower. Reporting by procedure or subsets of procedures could address this concern.
- There was some discussion about the increased usefulness of results when sorted by procedures, or by physician specialty, such as general surgeon, specialist surgeon or family physician.

Suggestions for improving the measure:

- Analysis, for certain types of procedures, by whether the surgery was done by a general physician or by a specialty physician, could be a helpful adjunct to hospital-level results. This type of stratified analysis is more appropriate to national or state results because of limited sample size.
- Consider analysis by surgery type. Stratified analysis requires larger sample sizes for reporting purposes.
- Consider separate analysis of the measures for planned surgery and for emergent surgery.

ED: Chest Pain/AMI – case identification

Panel readiness assessment:

It is appropriate to cast a broad net, using the codes applied in the field test, as a first step in case identification. In particular, it appears to be important to include the ‘chest pain’ code, since it appears from the field test data that many of the patients later diagnosed with AMI were initially given that code. A second step is necessary to define which patients identified through the ED codes were being managed as a possible or probable AMI or acute coronary syndrome to eliminate patients not appropriate for AMI treatment.

Concerns and comments:

- Following this methodology may miss some patients with an AMI or acute coronary syndrome due to a wide variety of presentations and coding accuracy challenges.
- The group suggested that the codes used in the field test would capture the vast majority of patients treated for acute coronary syndrome or possible/probable AMI, and that this set of codes is sufficient for the two step case identification process outlined below.

Suggestions for improving the measure:

- Use a two step process for case identification:
 1. Identify cases for review using the ED discharge ICD-9 codes used in the field test.
 2. Abstract each of the identified cases and include only those cases with documentation of ‘acute coronary syndrome’ or ‘possible AMI’ or ‘probable AMI.’

ED: Chest Pain/AMI – ASA within 24 hours of arrival

Panel readiness assessment:

This is an important measure ready for use with a revised case identification method.

Concerns and comments:

- A few thought there should be a relatively short time threshold for ASA administration – something on the order of 30 minutes from arrival.

Suggestions for improving the measure:

- As previously noted, use a two step process for case identification:
 1. Identify cases for review using the ED discharge ICD-9 codes used in the field test.
 2. Abstract each of the identified cases and include only those cases with documentation of ‘acute coronary syndrome’ or ‘possible AMI’ or ‘probable AMI.’

ECG within Ten Minutes of Arrival

Panel readiness assessment:

Timeliness of ECG for patients suspected of having acute coronary syndrome or AMI is important – especially as part of the patient evaluation for reperfusion therapy. For patients who present many hours after the onset of their AMI, the timeliness of the ECG is less important. Careful thought needs to be given to the metric for “timeliness.” Perhaps with a longer threshold and also presenting median time to ECG, this measure is ready for use with a revised case identification method.

Concerns and comments:

- Some expressed concern that not all hospitals will be able to routinely achieve the ten minute threshold. Choice of a time cut-off is somewhat arbitrary: suggestions for alternative time thresholds were 15 minutes and 30 minutes.
- It is not uncommon for patients to arrive at rural hospital ED many hours – or even days – after the onset of AMI symptoms. For these patients, rapid ECG is not so important, since urgent reperfusion is not an option.
- It is important that ECGs (limited to 12-lead ECGs?) given in ambulances be counted, as was done in the field test.
- There was some concern that for cases which had inadequate documentation of time of arrival or time of ECG, they not simply be excluded from the measure. This lack of documentation is a problem the hospital should address.
- Panel members suggested that the timing of ECG *interpretation* was of greater importance.

Suggestions for improving the measure:

- As previously noted, use a two step process for case identification:
 1. Identify cases for review using the ED discharge ICD-9 codes used in the field test.
 2. Abstract each of the identified cases and include only those cases with documentation of ‘acute coronary syndrome’ or ‘possible AMI’ or ‘probable AMI.’
- Consider using a threshold longer than ten minutes and/or also present median time to ECG.
- Consider excluding AMI patients who present to ED long after onset of AMI symptoms. Also, a separate analysis could be done of patients who received reperfusion therapy, or for those who were candidates for reperfusion therapy.
- Address cases with missing data. Consider a separate measure of the number of cases that did not have documentation of time of arrival and/or time of ECG. Consider retaining these cases in the denominator and count them as not meeting numerator criteria.
- There was significant support for the concept of measuring ‘time to ECG interpretation’ rather than ‘time to ECG,’ since it is important that the ECG both be administered and interpreted in a timely fashion. It was a shared opinion that often the time to

interpretation is the more significant cause for delay. If a measure of time to ECG interpretation were possible, it was suggested 30 minutes would be a reasonable threshold. However, it was acknowledged that the time of ECG interpretation might often not be documented.

ED: AMI/Chest Pain – Cardiac blood markers drawn within 10 minutes of arrival

Panel readiness assessment:

There were a variety of opinions about this measure. A few thought that, with some modifications, a valid, meaningful measurement was possible. Most, however, thought a measurement for this area would either need to be approached in some different way or that timeliness of cardiac markers wasn't a good subject for a quality measurement at all.

Concerns and comments:

- The group knew of no scientific literature linking timeliness of cardiac markers to better AMI outcomes. This is a cause of great concern in determining the validity and usefulness of a quality measure.
- Though cardiac markers are useful in confirming AMI, the markers do not appear for some time after the onset of symptoms. Depending on how quickly the patient appears at the ED after symptom onset, the cardiac markers might not be present in blood taken at arrival. The more urgent issue is ECG, in order to determine whether the patient is a candidate for reperfusion.
- If there is an important timeliness issue at all, it is more a question of time to when results are back (60 minutes from arrival?) than time to blood draw.

Suggestions for improving the measure:

- There was not a lot of support for further work on a measure in this area. If further work is done, consider focusing on time from arrival to time when cardiac marker results are available.
- As previously noted, use a two step process for case identification:
 1. Identify cases for review using the ED discharge ICD-9 codes used in the field test.
 2. Abstract each of the identified cases and include only those cases with documentation of 'acute coronary syndrome' or 'possible AMI' or 'probable AMI.'

ED: AMI/Chest Pain – Thrombolytic within 30 minutes of arrival

Panel readiness assessment:

There is support for a measure of thrombolytic timeliness. The methodology should match the current CMS/JCAHO measurement, which forms the denominator from patients that are good candidates for reperfusion (including appropriate ECG findings). Some questioned whether 30 minutes is the right time standard.

Concerns and comments:

- Timeliness of reperfusion is a very current and important issue. Rural hospitals face pressure to transfer reperfusion candidates for PCI – both because of increasing research

evidence of outcome advantage of PCI over thrombolytics if PCI can be accomplished rapidly, and in some cases through pressure from cardiologists at referral hospitals. However, it is not always possible to get the patient to the referral hospital quickly enough for PCI to be accomplished within 90 minutes. There appears to be increasing concern about delayed reperfusion due to decisions to transfer rather than give thrombolytics. There are currently discussions about revising the ACC/AHA guidelines for AMI to make explicit the recommendation to give thrombolytics if PCI is not likely to be accomplished within 90 minutes from patient's first presentation. Decision-making around reperfusion strategy is an area where there appears to be important rural:urban and rural:rural differences, due to the differences in proximity to invasive cardiology centers.

- Some panel members emphasized the importance of developing a more focused measure of whether good candidates for reperfusion received it.
- The measure of thrombolytic timeliness should use the same methodology as the CMS/JCAHO measure to ensure comparability to the national data. The current CMS/JCAHO measure assesses thrombolytic timing for patients that qualify as good candidates for reperfusion (including appropriate ECG findings).
- Timing outliers need to be accounted for. If a different metric is used, median time to thrombolytic would be preferable to mean (average) time.
- There was some concern that if cases had inadequate documentation of time of arrival or time of thrombolytic administration, they not be excluded from the measure. This lack of documentation is a problem the hospital should address.

Suggestions for improving the measure:

- Ideally, the specifications should mirror those for the CMS/JCAHO measure and apply the measurement to patients who are good candidates for reperfusion. If a different methodology is chosen, the degree to which the different methodology impacts comparability should be assessed.
- Consider a longer time cut-off than 30 minutes and/or also include median time to reperfusion.
- Develop additional measures related to reperfusion strategy: 1) Was the patient assessed for reperfusion eligibility? (this was done in a study of Montana rural hospitals); 2) Time from presentation to reperfusion for patients transferred for PCI (time of arrival at Hospital A to time of reperfusion at Hospital B); 3) Has a comprehensive AMI/ACS patient management protocol been developed in partnership with the hospital where AMI patients are transferred?
- Consider a separate measure of the number of cases that did not have documentation of time of arrival and/or time of thrombolytic administration. Or retain these cases in the denominator and count them as not meeting numerator criteria.

ED: Chest Pain/AMI – Time to transfer

Panel readiness assessment:

Timing of transfer has different implications for different patients with AMI or ACS, so a measure of time to transfer for all these patients does not seem helpful for internal improvement or external reporting. Many elements related to transfer timing are beyond the hospital's control (examples: EMS availability; weather issues). There may be a potential measure related to time to transfer or time to decision to transfer for a subset of AMI/ACS patients.

Concerns and comments:

- Patients with AMI are transferred for a variety of reasons: some for acute PCI, some for non-urgent PCI (those with longer time since onset of AMI), and for other reasons. One 'time to transfer' standard does not apply to all of these patients.
- Because some elements affecting transfer time are beyond the hospital's control (examples: EMS availability; weather issues), time to *decision* to transfer could conceptually be more promising. However, in current documentation, the time that the transfer decision is made might not be noted.

Suggestions for improving the measure:

- Limit this measure to patients transferred for emergent PCI. There is great time urgency for patients transferred for emergent PCI – they receive PCI within 90 minutes of presenting at the first hospital. For this subset, time to transfer is relevant and important.
- Investigate ways that time to decision to transfer could be collected. This element could be made part of AMI/ACS protocol/documentation sheets. It probably isn't feasible to collect this information from current medical chart documentation.

ED: Pneumonia – Antibiotics within four hours of arrival

Panel readiness assessment:

There was widespread agreement that, though timeliness of antibiotic for pneumonia is a legitimate measure of emergency department functioning, this measure should be limited to patients admitted to the hospital or transferred to another hospital.

Concerns and comments:

- Scientific literature demonstrating improved outcomes for pneumonia patients through timely administration of antibiotics has been limited to admitted patients.
- Timing of antibiotic for pneumonia patients discharged from the emergency department was not deemed important enough to merit focused quality improvement effort.

Suggestions for improving the measure:

- Limit to *admitted* pneumonia patients – as covered in the CMS/JCAHO Community Acquired Pneumonia set of measurements, and consider adding transferred patients.
- There was discussion of the development of an ED pneumonia assessment measure, which might include a chest x-ray. The idea did not receive enthusiastic support, due to questions about whether a chest x-ray in the emergency department is needed for all pneumonia patients; and the reality is that sometimes the chest x-ray is taken at the clinic prior to a patient coming to the emergency department.

ED: Trauma – Monitoring of vital signs

Panel readiness assessment:

This measure holds promise, if it is applied to a subset of trauma patients. Panel members were particularly enthusiastic about how this measure is patient-centered, explicitly addressing the question, “are the hospital staff paying attention to me?” Since care for trauma patients is a key function of small rural hospitals, it would be desirable to have measures regarding trauma. There was support for the concept of a Yes/No metric for whether vital signs were assessed at least hourly (instead number of time vital signs assessed).

Concerns and comments:

- Hourly vital signs are not appropriate for all trauma patients. Patients with minor trauma might not need them as frequently as hourly and those with severe trauma are likely to need them more often. A measure of hourly vital signs could apply to a subset of trauma patients.
- Concern was expressed that a measure of ‘hourly assessment of vital signs’ might unintentionally give the impression that hourly vitals is sufficient for all patients. Clearly, some patients need vital sign assessment more often.
- Is four hours the right duration for purposes of this measurement? It was suggested that patients who need hourly assessment of vital signs are ill enough to need vitals checked with that frequency throughout their stay in an emergency department. Others indicated that most deterioration in vital signs will occur within four hours, and that limiting the measure to four hours will eliminate the problem of patients who have become stable and are simply waiting in the ED for a hospital bed.
- In the mid-1990s, JCAHO tested a set of hospital measures for management of trauma. The expert panel for the JCAHO project recommended vital sign measures not be moved ahead. There was concern that such a measure needed to be applied to a subset of trauma patients and there were questions whether the work of collecting the data was worth the effort.
- Of equal importance to monitoring vital signs is appropriate response to changes in vital signs.

Suggestions for improving the measure:

- Apply the measure of hourly vital signs to a subset of trauma patients. Exclude patients with minor trauma such as simple sprained ankle, etc. and include only those patients who are transferred, admitted to intensive care unit, or sent to surgery. The measure should be clearly defined as ‘vital signs assessed *at least* hourly.’
- To facilitate ease of abstraction, consider having abstractor record all times of vital sign assessment within the first four hours and, as a second step, have them assess whether vital signs were assessed during each one-hour interval.
- Consider developing a measure of appropriate response to change in vital signs as a companion to the measure of hourly vital signs assessment.

ED: Transfer Communication

Panel readiness assessment:

This measure holds great promise, though it needs some revision. There was unanimous support that information should be sent with the patient or be communicated in a reasonable time frame. The time frame needs to be determined (30 minutes from patient departure from the hospital? 60 minutes?). Changes might be needed in the categories of information (now 16 of them) encompassed in the measure.

Concerns and comments:

- Need to avoid penalizing hospitals for not sending all information with the patient. In some cases, it is not feasible to gather all the information in this measure before the patient leaves the door, without delaying the transfer. The measure should count information that is sent by fax within a reasonable time from when the patient leaves the hospital.
- The 16 elements in this measure may need adaptation and updating. Should this document be consistent with Continuity of Care Record (CCR)? If yes, a method of updating must be incorporated into the measure. One of the panel members who is actively involved in CCR work reviewed the specifications used in this measure in detail, consult with others involved in CCR, and proposed revisions (see Appendix 21).
- The current CCR designated some elements (including some used in this measure) as ‘optional.’ Some of the elements are more important for patient care than others. Should some of these be designated as optional?
- There needs to be more detailed definition of what constitutes a positive answer for each of the data elements.
- The appropriate benchmark for this measure is not 100%. There are some patients for whom not all of the 16 items will be known when transferred. Example: AMI patient brought in unconscious without family or identification.

Suggestions for improving the measure:

- Change measure to accept information faxed or called in to the transfer hospital within 30 minutes (or 60 minutes?) of when the patient leaves the small rural hospital.
- Consider revisions to the current list of 16 information items in this measure, pending further review by persons working closely with CCR.
- Make the data collection specifications more detailed, and ideally fully aligned with CCR specifications.
- Consider using the measure on a broader set of transfers. For convenience in this project, the measure was applied to transfer of AMI/chest pain, pneumonia, and trauma cases from the emergency department. All transfers from the entire hospital could be eligible for inclusion.
- Find a way to bundle a measure like this one with other measures to give a more robust composite picture of emergency department quality. Given that there is some tension between completeness of documentation and speed of transfer in some cases, it would be

particularly helpful to supplement this measure of information transfer with a measure of timeliness of transfer. This bundling of measures might work particularly well for certain conditions, such as transfer for emergent PCI.

- A detailed note: What the tool calls, ‘History and Physical’ should more appropriately be called ‘patient assessment.’

Cross-Cutting Measure: Advance Directives

Panel readiness assessment:

The timing is right nationally to focus on issues related to Advance Directives (AD).

Assessment of AD status is: 1) part of the Medicare Conditions of Participation (COP) for both Prospective Payment System hospitals and Critical Access Hospitals; 2) a JCAHO standard; and, 3) required by law in some states. However, this measure is a compliance issue and doesn’t answer the patient’s main question: “Will my Advance Directive wishes be honored?” The measure as field-tested might be useful for internal quality management, but not for public reporting.

Concerns and comments:

- This measure applies to all adult hospital admissions, not only to the convenience sample of heart failure, pneumonia, and surgical patients used in the field test.
- What patients really want to know is whether their Advance Directive wishes will be followed, and measure of documentation whether or not a patient has an Advance Directive doesn’t go very far toward answering this question. On its own, is performing and reporting this measure worth the effort?
- It might be a good idea for hospitals to measure this to assure compliance with COP, accreditation, and/or law and as a first step toward honoring patients’ AD wishes, but it may not be a good measure for public reporting.
- The public might misinterpret this measure – for example, misunderstanding it to mean the proportion of patients that have an Advance Directive or the proportion of patients who don’t want aggressive resuscitation.

Suggestions for improving the measure:

- If used, this measure should be applied to all adult hospital admissions.
- Perhaps what is needed is a companion measure - or simply a different measure - that answers whether wishes in an Advance Directive were honored. Such a measure would be quite complex, and may not be adequately documented in the medical record.

Cross-Cutting Measure: Medication Teaching

Panel readiness assessment:

There was strong agreement that ensuring patient and family understanding of medications (and other issues) at discharge is very important and worthy of quality improvement work and quality measurement. However, the simplistic measurement used in the field test is not sufficient for internal quality improvement work or for public reporting. Assessing a patient’s level of understanding will be labor intensive. To improve feasibility of this assessment, efforts could first be directed to a subset of situations where drug management might be especially challenging, i.e. patients discharged on high-risk medications or on a large number of

medications. As another approach, a standardized process and forms for conveying information about discharge medications could be adopted.

Concerns and comments:

- Counting whether a box is checked (‘patient instructed on medications at discharge’) or whether a discharge form a patient signs includes mention of understanding medications at discharge provides little information on the degree of patient understanding. Patients are likely to sign whatever is put in front of them to facilitate discharge. Similarly, patients are likely to say, “Yes, I understand” to speed discharge and hospital staff may be eager to check “Yes, patient instructed on medications” so they can move on with their work.
- What is really needed is a patient-focused measure: an assessment of whether the patient in fact understood and can manage their discharge medication regimen. Assessing patient understanding by survey after discharge would work, but is labor and resource intensive.
- Medication regimen is only part of a broader range of things (example: diet, wound care) the patient and/or their family needs to understand at discharge. To start seriously assessing how well their hospital discharge education is working, a hospital will probably need to start with a narrow focus (example: certain diagnoses and/or certain aspects of discharge education) and grow their measurement efforts over time.
- Health literacy is at the heart of ensuring understanding medication regimen. Work needs to be done on ensuring assessment of health literacy and accommodating teaching to a patient’s level of health literacy.
- There is a locus of control issue regarding ensuring understanding of medication regimen. Professionals and organizations agree two-way communication with patients should be done to ensure understanding of medication regimen, but it is not clear who is responsible at a given point in time.
- This topic is part of the whole area of Continuity of Care that is in such need of attention and work.

Suggestions for improving the measure:

- A new approach is needed that gets at patient understanding of medications at discharge. A survey of patients after discharge may provide information about their understanding of their medication regimen, but it would be resource intensive. To improve feasibility, such a survey assessment could start with patients discharged on a short list of high-risk medications or on a large number of medications.
- Lacking a formal assessment of patient understanding, work could be done to develop standardized forms for presenting medication information in an understandable format. Example: list of medications with table indicating doses and times each is to be taken and contact name and phone number to be called with questions.
- ‘Medication reconciliation’ is a topic now being promoted nationally for quality improvement work. Work in the area of medication reconciliation could be extended to ensuring understanding of medication regimen at discharge.

- Hospital Consumer Assessment of Health Plans Survey (HCAHPS), the patient experience of care survey for hospitals, includes a question on discharge instructions (not specific to discharge medications). Comparison of responses to this question could be used to check the validity of the results from a ‘medication teaching’ measure such as the one used in the field test.
- Consider developing two measures; assessment of health literacy and an assessment of a hospital’s ability to tailor education to a patient’s level of health literacy.

Cross-Cutting Measure: Medication Safety Checklist

Panel readiness assessment:

The panel’s discussion showed strong interest in medication safety assessment tools and measurements as a way of promoting and facilitating improvement in this area. Some emphasized the need for some kind of measurement suitable for comparison to be defined in the near future. There was some sentiment that a broad checklist, such as was used in the field test, might be more useful as a road map for internal assessment and planning than for comparative measurement. Support grew for a measure based on a smaller number of evidence-based elements, preferably ones that are represented in the Leapfrog Group’s 4th Leap and/or the JCAHO Patient Safety Goals. Because one of the chief values of a tool of this kind is educational, it was emphasized that the checklist should include detail on what a hospital needed to do to comply with current standards and guidelines, as well as link the hospital to resources for improvement. The tool needs detailed specifications to facilitate objective responses, and a validation methodology needs to be developed and tested.

Concerns and comments:

- A validation process is needed to give credibility, for comparison purposes, to self-reported results. More detailed and more specific instructions are needed. There currently appears to be a high degree of personal interpretation in completing some of the checklist elements.
- The checklist only gets at whether policies or protocols are in place, not whether they are consistently and appropriately used. Example: a hospital might have developed an insulin protocol, yet it could be used infrequently or incorrectly.
- Perhaps a checklist like this shouldn’t be made into a measure at all; it could serve a useful purpose without providing a comparative measurement. “Maybe we’re struggling to make this a measure when it is really best used as a roadmap. Many small hospitals, though not reporting on the Leapfrog 4th Leap, are using that tool as a roadmap.”
- The checklist should serve an educational function. For that reason, it is important to give more detail and specificity about what a hospital needs to do to comply with current national standards and guidelines. (Examples: links to JCAHO standards, CDC recommendations, etc., and links to systems improvement resources).
- Defining a reportable measure of medication safety – relevant to hospitals of all sizes - is a high priority issue. Despite the difficulty of developing a universally accepted measure for medication safety, there is great urgency among buyers of health care for at least some measurement in this area they can use. There was a strong feeling at the panel that a fast-track group should be assembled to work out a reportable measure in this area.

- It might be possible to create a measure from a small subset of elements now present on the checklist: areas where there is clear scientific evidence or a high degree of consensus on the relationship between the practice and better outcomes.
- The checklist should be compared with Leapfrog's 4th Leap (based on the NQF list of 27 Safe Practices), and JCAHO's Patient Safety Goals, looking for areas of overlap. The areas of overlap could serve as the basis for a measure. JCAHO has put together a spreadsheet that provides a crosswalk between NQF 'Safe Medical Practices,' Leapfrog 4th Leap components, and JCAHO Patient Safety Goals.
- JCAHO has produced Patient Safety Goals for some of the topics represented in the checklist. Most of the goals have binary status assessments. Care should be taken to make sure the specifications for these elements on the checklist are compatible with JCAHO definitions.
- JCAHO and Leapfrog are now working to streamline the Leapfrog 4th Leap to make it easier to fill out and to make it more auditable. Also, NQF is revising the '27 Safe Practices' list the Leapfrog 4th Leap is based on, which could result in some revisions to the content of the 4th Leap.
- A recent AHRQ survey indicates there are many low-tech policy-type patient safety interventions that are not in widespread use. At this time, priority should be given to a few areas for improvement that are proven to be associated with improved patient safety and don't require expensive high tech investment.
- There needs to be specific detail about what qualifies as a medication error surveillance system (called, 'safety screen system in place' in the checklist). Substantial work needs to be done to develop and publicize systems feasible and relevant for small hospitals.
- The experience a pharmacist has in hospital pharmacy is probably more relevant to safety than whether or not the pharmacist has a PhD. Including the question 'does the hospital pharmacist have a PharmD?' is likely to give the message that it is a problem if the pharmacist doesn't have a PharmD.
- Pharmacist availability is a key issue, and it is good to include questions about it on a checklist, since it spurs thinking on this issue. The key issue is 24-hour access to pharmacy expertise, not number of hours the pharmacist is on-site. Creative solutions such as tele-consultation are increasingly available.

Suggestions for improving the measure:

- Produce more detailed specifications for responding to the checklist components and develop and test a validation process.
- Limit the measure to a few, well-defined elements. Ideally, these elements would mirror JCAHO Patient Safety Goals and/or Leapfrog 4th Leap components. Priority should be given to evidence-based practices that don't require a lot of expensive technology investment.
- Elements from the existing checklist that panel members thought held particular promise:

- Allergy lock-out system in place
 - IV devices have free-flow protection system
 - Percent of IV solutions that are pre-mixed
 - Unit dose system in place (“There should be no open stock dispensing. Plus, a unit dose system is a step toward bar coding.”)
- Encourage JCAHO and Leapfrog, as they revise the Leapfrog 4th Leap, to make sure the measurements are relevant to hospitals of all sizes.
 - Consider reformatting the survey – or making two surveys – to fit the reality that some of the elements aren’t applicable without a computerized pharmacy system.
 - The element, ‘Medication safety project in process,’ is too general to be meaningful. Even a minimal effort could trigger a ‘yes’ answer. This could give a false sense of security. Possible alternative: ‘In the past XX months has a Failure Mode Effects Analysis (FEMA) been done?’
 - Consider adding something to the checklist that addresses nursing IV procedural sedation. A project with small hospitals in Montana showed lots of opportunity for improvement both in clinical competency and in documentation.
 - Consider revising the current element asking whether the hospital pharmacist has a PharmD to get at the issue of experience in hospital pharmacy, rather than simply academic degree.
 - Revise the element; ‘pharmacist hours per week,’ to more directly address the question of 24-hour access to pharmacist expertise.
 - Change Unit Dose Capacity element to ask whether all medications are unit dose (not whether there is a system in place – implying that at least some medications are unit dose).

Administrative Measures: Cesarean Section (C-section) Rate

Panel readiness assessment:

Most on the panel thought a different approach was needed, but that it was very important to have measurements for labor and delivery services. Separation of C-section types would provide a better view of care delivery patterns at the hospital; for example, separating primary from repeat C-sections. Another approach is to determine if cases were managed according to national guidelines. Measurement of care management would require medical record abstraction and has its own validity challenges.

Concerns and comments:

- Measures related to deliveries are important to small rural hospitals, since it is a very important part of their services.
- There are many different ways to calculate C-section rate: one panel member referenced a report that found 27 different ways! For a measure like this, very detailed

specifications are needed to make sure all reporting entities are producing numbers in the same way.

- Without accounting for whether a woman is eligible for C-section (for example, by American College of Obstetricians and Gynecologists [ACOG] guidelines), it is not clear whether a hospital's C-section rate is higher or lower than it should be.
- A growing number of women are expressing a preference to have a C-section delivery. A measurement of whether delivery is managed according to national guidelines might need to take patient preference into account.
- The CDC has done work in developing C-section rates based on birth certificate data. It might be worthwhile reviewing their work, though state variation in birth certificates might limit national implementation, plus this data source has many of the same limitations as billing data.
- JCAHO has three measures in its set of Pregnancy and Related Conditions (PR) measures for hospitals: 1) Vaginal birth after C-section; 2) Inpatient neonatal mortality; 3) Third or fourth degree laceration), and it has identified a set of possible future areas within the PR set. The new pregnancy measures being considered are in the suggested new measurement list on page 61. Note: many of these pregnancy measures were considered by the first expert panel but were not given high priority.)
- The National Association of Children's Hospitals and Related Institutions (NACHRI) has developed quality measures for care of children. They might also have measures for labor and delivery.

Suggestions for improving the measure:

- Produce more detailed specifications, especially regarding labor management and a patient's previous delivery experience, for data collection.
- Base a different measurement on whether deliveries are consistent with national guidelines (example: ACOG).
- Check with the National Quality Forum to see if measures of labor and delivery have gone through their consensus process.
- Monitor work JCAHO is doing to define additional measures for its Pregnancy and Related Conditions (PR) set of hospital measures.

Administrative Measures: Laparoscopic Cholecystectomy Rate

Panel readiness assessment:

There was not a lot of support for this measure. The majority of panel members thought either that this area was not particularly important for measurement or that a new approach of some kind was needed for a measurement in this area.

Concerns and comments:

- Some cholecystectomies are best done as 'open' (not laparoscopically). So the benchmark for a measure like this is not 100%, and it isn't clear what a benchmark figure should be. Interpretation of the current measure may suggest that all cholecystectomies

be laparoscopic. There may be unintended negative consequences by sending this message.

Suggestions for improving the measure:

- If this measure is used, consider adding as an adjunct a measure of cholecystectomy complications.

Administrative Measures: Adverse Drug Reaction Rate and Medication Error Rate

Panel readiness assessment:

It was felt the issues surrounding these two measures were very similar, and they were discussed together. There was wide agreement that rates of ADRs and medication errors were very important areas for measurement but that before public reporting could be done responsibly, hospital capacity to ascertain errors and drug reactions and medication doses needs to be improved. In the short term, these measures might be useful for internal tracking and improvement. Work needs to be done to develop and publicize methodologies for surveillance of ADRs and medication errors that are feasible for hospitals of all sizes. The Institute for Healthcare Improvement (IHI)'s 'Trigger Tool' might be a good place to start. Suggestions of structural characteristics that could be part of a measure or suite of measures were made.

Concerns and comments:

- There is urgency around developing measures of medication errors and/or ADRs that are suitable for public reporting, both because health care purchasers are demanding it and because these numbers are important for getting senior managers and board members to pay attention to the issue. Some on the panel felt that deriving a measure from elements of the 'Medication Safety Checklist' might suffice, for now, as a measure for public reporting.
- The quality and uniformity of data collected by hospitals (examples: number of ADRs, number of medication errors, number of medication doses) must be improved before public reporting of ADR/medication error rates. Work needs to be done urgently to develop and publicize methodologies for surveillance of these issues that are feasible for hospitals of all sizes.
- These measures might be useful now for internal tracking.
- Incident reports are not a good source of counts of medication events for these measures. Incident reports may be viewed as having punitive consequences. Establishment of a culture of safety within an organization is a key step in medication and adverse drug reaction reporting.
- More important than the counts of events is what is done with information about these events; what steps are taken to learn from the events and to prevent future events.
- Structural attributes of a hospital could serve as the basis for a measure, reporting of comparable measures on ADR and medication error rates. A measure of structural attributes should serve an educational function ("Do you have X in place? Here is what X means and here are information resources on getting X into place"). Examples of possible structural attributes:

- Safety culture – AHRQ safety culture survey tool (with minor modifications) is now being used in various projects, including one with small hospitals in Tennessee.
- Participation in an external reporting system, such as MERS-TM.
- It is very difficult for hospitals to collect accurate data on the number of medication doses administered. Without a computerized pharmacy system, it might be impossible.
- Use of certain drugs (example: Narcan), or certain lab results (example: very high digoxin levels) in the hospital setting could be used as the basis for a measurement methodology (see IHI ‘Trigger Tool’).
- Improving medication safety does not require valid, feasible methodologies for quantifying ADRs and medication errors. Structural improvements can be made without these.

Suggestions for improving the measure:

- Work needs to be done urgently to develop and publicize methodologies for surveillance of ADRs/med errors that are feasible for hospitals of all sizes. The IHI ‘Trigger Tool’ might be a good starting point.
- Consider developing a measure based on structural attributes related to medication safety (example: safety culture; participation in an external reporting system. See Appendix 8: ‘Medication Safety Checklist’).

Administrative Measures: Medicaid Denial Rate

Panel readiness assessment:

There was no support for this measure on the panel. It received little discussion. Each state Medicaid agency approaches payment denial in a different way, making a single national measurement methodology impossible. Panel members did not find it an important area to focus on for new measurement development.

Suggestions for New Measures Relevant to Small Rural Hospitals

In addition to discussing each of the measures used in the field test, the panel discussed some ideas of additional quality measures that could be relevant to small rural hospitals.

- **Acute Myocardial Infarction/Acute Coronary Syndrome:**
 - Appropriate assessment for whether patient was a reperfusion candidate
 - Whether reperfusion candidates received reperfusion therapy
 - For patients transferred for PCI: time from arrival at small hospital to time of balloon inflation at referral hospital
 - Whether the small rural hospital and referral hospital have developed and implemented a management protocol and actively partner to assess and improve the protocol
 - Synthesis of a variety of measures into one composite measure for this area
 - Beta-blockers on arrival (The role of beta-blockers at hospital arrival for AMI patients is now being re-evaluated by cardiology experts and panel members advised the team to postpone our re-evaluation until results from the expert are available.)
- **Trauma Vital Signs Monitoring:**
 - Appropriate response to change in vital signs
 - Appropriate assessment and documentation of Glasgow Coma Scale for patients with severe trauma
 - Time to transfer for serious trauma cases
 - Whether the small rural hospital and referral hospital have developed and implemented a management protocol and actively partner to assess and improve the protocol
- **Medication Understanding:**
 - Assessment of health literacy of patient
 - Demonstrate that hospital staff are able to tailor education to a patient's level of health literacy
- **Pregnancy Measures:**
 - JCAHO pregnancy measures being considered include:
 - Presence of prenatal record at time of admission
 - Episiotomy rate
 - Indications and/or rate of elective labor induction
 - Primary cesarean section rate
 - Attempted (unsuccessful) vaginal birth after cesarean section

- Neonatal transfer to perinatal center or Maternal transfer to perinatal center
- o Other possible areas for alternative measures were suggested:
 - Is the hospital actively monitoring labor?
 - Is there an adequate system (protocols; arrangements with other hospitals) in place to care for an OB case that becomes complicated emergently?
 - Obstetrical and neonatal transfer
 - Time from ‘decision to incision’ for C-sections
- **Measures of Care for Children (NACHRI has developed such measures)**
- **Emergency Department Staffing:**
 - o The ED is an important risk area for small rural hospitals.
 - o Society for Academic Emergency Medicine developed a program to categorize hospitals based on their emergency department staffing. It was geared mostly to larger hospitals and they dropped it because of low demand for the program. Could serve as a starting point for developing something appropriate to small rural hospitals.
 - o One of the key issues is to identify emergency departments that are sometimes staffed by physicians who only infrequently work in the ED.
 - o This can be a complex area. Use of board certified ED physicians might not be feasible because of low patient volume and other reasons. Use of midlevel practitioners (example: nurse practitioners) is sometimes controversial. Small rural hospitals might not have a lot of options for staffing the ED. Telehealth offers potential for consultation from a distance.
 - o Training in Advanced Cardiac Life Support and Advanced Trauma Life Support.
 - o Evidence that the hospital has reasonably assessed its capacity and has developed policies – including partnerships with other hospitals and regional arrangements - to assure good care for patients.
 - o Experience with pediatric emergency care.
- **Measures Related to Falls:**
 - o NQF has a ‘falls’ measure. JCAHO has Patient Safety Goals related to falls. (Note: this was an area of measurement in the initial set of measurements reviewed by the original expert panel, but it was eliminated as a priority area).
- **Measures Related to Pain Management:**
 - o JCAHO is working on measures in this area.
 - o Historically, measures of pain control have focused on cancer patients. A more general measure of pain management regardless of diagnosis would eliminate the small sample problem inherent if only cancer patients are included in the sample.

- **Leadership’s Engagement with Quality and Safety:**
 - Include Board of Directors. How are assessments and results of initiatives reported? Is there a Board committee for quality/safety?
 - How is QI manager/director chosen? To whom does this person report?
 - What are lines of accountability for quality/safety?
- **Emergency Medical Services Measures:**
 - Access to Advanced Life Support transport
 - Measures of availability and timeliness
- **Laboratory Services:**
 - Examine the issue of when a hospital needs access to and use of the services of a regional lab (example: microbiology resistance testing)
- **Surgical Case Selection:**
 - Evidence the hospital has articulated case selection parameters for procedures
 - Transfers because hospital can’t provide appropriate post-surgical care
- **Infection Control Measures:**
 - Compliance with hand washing protocols (positive experiences cited from small hospitals that did hand washing studies. Focus on the issue dramatically improved hand washing).
- **Procedural Sedation:**
 - A project on this topic with small hospitals in Montana showed ample room for improvement both in competency and in documentation
- **Patient Experience of Care:**
 - HCAHPS has had extensive testing and will be rolled out nationally soon.
- **Measures of Disparities in Care:**
 - Racial/ethnic
 - Urban/rural
- **Measures of Efficiency:**
 - Measures of financial performance and efficiency are important as an adjunct to clinical quality measures and measures of patient experience
 - Include both costs and reimbursements
- **Measures of Continuity of Care Across Care Settings:**
 - This should include measures of relevant patient data being returned in a timely way to primary care physician when a patient is discharged from a tertiary care center.
- **Methodology to help small rural hospitals carry out their responsibilities to do credentialing based on data.**

- **ICU Care:**
 - Preventing deep venous thromboses (Note: this was an area of measurement in the initial set of measurements reviewed by the original expert panel, but it was eliminated as a priority area).
 - Preventing central line infections (Note: this was an area of measurement in the initial set of measurements reviewed by the original expert panel, but it was eliminated as a priority area).
 - Intensity of nursing staffing
 - Defining what constitutes an ICU bed will be a challenge, but there should be valid ways to make this definition.
- **Pressure Ulcers:**
 - There is increasing evidence that pressure ulcers start developing very rapidly in patients at risk. (Note: this was an area of measurement in the initial set of measurements reviewed by the original expert panel, but it was eliminated as a priority area).
- **Swing Bed Care:**
 - Swing beds are an important aspect of care for many small rural hospitals
 - Important to demonstrate that functional improvement during rehab is as good as other rehabilitation options such as nursing homes and inpatient rehabilitation facilities.

Action steps needed for small rural hospitals to integrate quality measurement into daily operations

In addition to discussing specific measurements and measurement areas, the panel also spent some time identifying actions needed to make quality measurement a vital part of operations at a small rural hospital. The discussion touched on a number of areas, including external incentives, the role of leadership, the importance of partnerships, technical assistance needs, and infrastructure requirements.

Implement Regulatory and Financial Incentives

- Contract requirements can require quality management programs and reporting of quality measurement results.
- Incentives can be built into payment structures. Example: percentage increases in payments for services can be based on achieving specified levels of performance or improvement on performance on quality measures (as in Medicare's demonstration project with Premier) or incentives or penalties can be put in place for the reporting of quality measures (as in Medicare's reduction in annual payment update for PPS hospitals that don't report a core measurement set).
- Sometimes most needed is up-front cash (example: for buying an electronic health record system).
- Financial incentives through state Medicaid programs seem unlikely in the near term, given the particular strain on Medicaid funding at this point.
- Health plans that benefit from high quality care at rural facilities should share those benefits with the facilities. Work is needed to document the financial benefits that accrue to health plans and other payers from high quality care provided by rural facilities.

Expand Ranks of Leaders who Make Quality a Strategic Priority

- Some administrators and boards at rural hospitals have a compelling vision for coordinated, patient-centered care. This vision helps them create an organizational culture that rejects mediocrity and makes quality a strategic goal. Modeling and testimonials from administrators who already have such a vision – especially those that have created changes in their organizations and have positive results to report – can be very powerful.
- Examples and case studies of return on investment in quality management are needed to convince skeptical administrators and boards who are used to focusing on financial issues. They need to know how spending resources on measurement will result in better care for patients and a better outcome for the organization.
- Image of the hospital will be an important motivator in getting the attention of the administrator and board. They are concerned about several stakeholder groups' image of the hospital:
 - o Legislators and state agencies (to be perceived as committed to quality improvement; a provider of services equal in quality to urban facilities)

- o Community members (the persons most likely to be treated at their facility; persons, who in some cases, have an option to use other facilities)
- o Their regional medical centers (to be perceived as well-qualified to receive patients discharged from the regional medical centers)
- There is a need for technical assistance to administrators and boards to help them identify feasible strategies for making quality an organizational priority and for support as they implement these strategies. Examples of strategies: executive walkarounds; board committee for quality; aligning stated vision and mission with budgets; balanced scorecard methodology, etc.
- Leadership is not limited to administrators and boards. At all levels of staff, opportunities for leadership are present. But training and mentoring in leadership is necessary to develop leadership skills in staff.

Create Partnerships and Networking Opportunities

- A forum is needed to help coordinate the efforts of national organizations interested in maintaining and improving health services in rural areas.
- At the state level, more opportunities are needed for staff from rural hospitals to get together to share ideas, strategies, and enthusiasm for quality improvement. Networking can facilitate more formal sharing of best practices and models. In addition, formal networking opportunities often lead to development of informal support networks.
- It might be possible to join forces with others who have a stake in retaining vital, high quality rural hospitals: example – family physicians, who are in the midst of efforts to shore up their future (see The Future of Family Medicine report, available on through the American Academy of Family Physicians web site).

Provide Technical Assistance

- Rural hospitals often do not have the staff flexibility and funds to send staff to national conferences, so local technical assistance is all the more valued and needed.
- Though theoretical background can be helpful, what is crucial is concrete, specific action steps and work plan outlines to guide efforts.
- Customized training in a variety of areas (examples: helping nurses, administrators, and physicians work together as a team; leadership development; how to set up accurate, efficient medical record abstraction programs) is needed.
- Many tools, methodologies, and strategies for measurement and improvement currently exist in sharable formats. What is needed is convenient packaging of these resources to facilitate connecting rural hospital staff with them. These resources need to be available both in hard copy and web-based.
- Many hospitals would welcome assistance in finding ways to create a positive partnership between the medical staff and the hospital administration, with quality of care as an area of aligned interest.

Ensure and Build Infrastructure

- Health information technology is a particular challenge. It is known that numerous aspects of HIT need to be implemented in the near future, but it presents financial and staff challenges. Successful adoption of HIT requires a substantial amount of staff time for developing HIT strategy and planning, as well as for changing work flow and training. Both the costs for purchasing products and providing technical support, and the staff time required for making the changes, can seem insurmountable. Strategies are needed to build on existing HIT adoption experience to help hospitals make their HIT planning and implementation efforts as efficient and effective as possible.
- Workforce is another area of challenge. Qualified professionals are needed in multiple disciplines, and it can be particularly difficult in rural areas to maintain persons in these positions. Efforts are needed both to ensure supply of health care professionals in rural areas (strategy examples: creating training programs in rural areas; incentives for professionals to work in rural areas) and to assist hospital leaders develop effective strategies for attracting and retaining professionals.

Conclusions

The presentation of conclusions is divided into three sections: 1) assessment of the measures (including the study team's rating of each measure's readiness for use and comments on each measure; 2) a summary of lessons learned through the experiences of hospital recruitment, training, and technical assistance, and organizing and convening the expert panel; and 3) suggestions of next steps to promote the use of quality measures relevant to rural hospitals.

Assessment of Measures

The perspectives and measurement results of the hospitals in the field test and the opinions of the expert panel informed the study team as it developed the final assessments reported in this section. For the most part, the perspectives of the expert panel regarding a measure's readiness for use correlated with the hospitals' opinion on the feasibility and usefulness of the measures. Important differences of opinion between hospitals and the expert panel will be pointed out in the comments on the measures.

The measurement readiness ranking presented here mirrors the format used with the expert panel. As mentioned previously in this report, there is not a clear dividing line between the categories, but the study team has used its best judgment to place each measure in the category that seems the best fit, based on all the information gathered in this project. The comments on the measures are intended to provide rationale for how each measurement was categorized.

Assessment of Measures: Measurement Readiness Ranking

Category 1: Can be used for comparative measurement as is or with minimal modifications (example: addition of diagnostic codes for case identification)

- Inpatient: Heart Failure
 - Smoking assessment and counseling
 - LVF assessment
 - ACEI for LVSD
 - Discharge instructions
- Inpatient: Pneumonia
 - Smoking assessment and counseling
 - Initial antibiotic received within four hours of hospital arrival
 - Oxygenation assessment
 - Pneumococcal vaccine assessment and administration
- Inpatient: Surgical Infection Prevention
 - Prophylactic antibiotics received within one hour prior to surgical incision
 - Prophylactic antibiotic selection for surgical patients
 - Prophylactic antibiotics discontinued within 24 hours after surgery end time
- Cross-Cutting Measure: Advance Directives

Category 2: Will need changes and additional testing in order to be used for comparative measurement, but the general approach seems appropriate (example: additional data elements need to be abstracted from medical record for denominator inclusion criteria)

- Emergency Department: Chest Pain/AMI – ASA within 24 hours of arrival
- Emergency Department: Chest Pain/AMI – ECG within ten minutes of arrival
- Emergency Department: Chest Pain/AMI – Thrombolytic administration within 30 minutes of hospital arrival
- Emergency Department: Trauma – Monitoring of vital signs
- Transfer Communications

Category 3: Important subject for comparative measurement, but needs a new measurement approach (examples: current measure does not get at the key clinical issue; hospitals not currently able to provide comparable data)

- Emergency Department: Chest Pain/AMI – Cardiac blood markers drawn within 10 minutes of arrival
- Emergency Department: Chest Pain/AMI – Time to transfer
- Cross-Cutting Measure: Medication Teaching
- Cross-Cutting Measure: Medication Safety Checklist
- Administrative Measure: Cesarean Section Rate
- Administrative Measure: Adverse Drug Reaction Rate
- Administrative Measure: Medication Error Rate

Category 4: Not an important subject for comparative measurement

- Emergency Department: Pneumonia – Antibiotics within four hours of arrival
- Administrative Measure: Laparoscopic Cholecystectomy Rate
- Administrative Measure: Medicaid Denial Rate

Assessment of Measures: Comments on the Measures

Inpatient: Heart Failure

Hospitals were able to collect data for these measures without difficulty and with a high degree of accuracy. They found the measures very useful for internal quality improvement and quite useful for external reporting. One hospital that collected data for the heart failure measures is exploring ways to transfer left ventricular function information from outpatient or old hospital records to the current hospital record.

The expert panel found the four heart failure measures to be ready for use with the following modification: the ‘ACE Inhibitor for LVSD’ measure should be changed to be consistent with revisions to the parallel inpatient CMS/JCAHO measurement, which makes an accommodation for the role of angiotensin receptor blockers.

▶ The four inpatient heart failure measures are placed in Category 1.

The panel thought the ‘Smoking Assessment and Counseling’ measure should not be limited to heart failure and pneumonia patients, but should be applied to all inpatients. Aggregating cases for the ‘Smoking Assessment and Counseling’ measure across patients with different diagnoses will also help address the small numbers problem evident in the field study. Though 94% of the 69 heart failure patients included in the project were assessed for smoking, only two patients were found to be smokers. The low prevalence of smoking among heart failure patients at the seven hospitals that collected heart failure measurement data might not be representative of small rural hospitals in all parts of the country.

The CMS/JCAHO heart failure measure for discharge education excludes patients from the denominator who are transferred to a swing bed. The field test data collection tool was modified from the CMS/JCAHO tool to allow hospitals to capture discharge instructions given at the time of discharge from the swing bed. Therefore, patients were included in the denominator for this measure when they were transferred to a swing bed. Including swing bed patients in this measure more accurately reflects care provided in a rural hospital. The panel supported this change.

Inpatient: Pneumonia

Hospitals were able to collect data for this measure without difficulty and with a high degree of accuracy. They found the measures quite useful for internal quality improvement and quite useful for external reporting.

The expert panel found the pneumonia measures to be ready for use, with the following revision: to be consistent with the CMS/JCAHO inpatient pneumonia measures, exclude patients under age 18. The panel was of mixed opinion whether the oxygenation assessment measure was worth the effort to collect data for it, given high levels of performance.

The panel thought the ‘Smoking Assessment and Counseling’ measure should not be limited to heart failure and pneumonia patients, but should be applied to all inpatients. Aggregating cases for the ‘Smoking Assessment and Counseling’ measure across patients with different diagnoses will also help address the small numbers problem evident in the field study. Though 90% of the 96 pneumonia patients included in the project were assessed for smoking, only twenty patients were found to be smokers. The low prevalence of smoking among pneumonia patients at the

eight hospitals that collected inpatient pneumonia measurement data might not be representative of small rural hospitals in all parts of the country.

▶ **The four inpatient pneumonia measures are placed in Category 1.**

Inpatient: Surgical Infection Prevention (SIP)

Hospitals were able to collect data for this measure without difficulty and with a high degree of accuracy. They found the measures quite useful for internal quality improvement and quite useful for external reporting. At least one hospital has proceeded with a physician-led SIP improvement project within months of receiving their measurement results.

In the field test, case identification procedure codes were limited to a subset of the list used for the CMS SIP measures; a subset thought more likely to be performed at small rural hospitals. This was done in the hope of simplifying case identification for the hospitals. Surgical volume for the subset of procedure codes was relatively small at most of the seven hospitals that collected data for these measures. Use of the full set of procedures codes used in the CMS SIP measures could increase denominator size.

Care needs to be taken in comparing hospital performance on these measures. National results show performance is lower for some types of surgery (notably, colon surgery). If, as some on the expert panel believe, these types of procedures make up a larger share of surgical volume at small rural hospitals than at large hospitals, then overall hospital performance may tend to be lower. Reporting by procedure or subsets of procedures could address this concern.

▶ **The three SIP measures are placed in Category 1.**

ED: Chest Pain/AMI

Hospitals had little trouble using emergency department diagnostic codes to identify cases. Abstraction of data for these measures presented few problems, though some hospitals learned the automatic time stamp on their ECG machine required resetting. The hospitals were enthusiastic about usefulness of some of the measures in this area, particularly, ‘ASA within 24 hours of arrival,’ ‘ECG within ten minutes of arrival,’ and, ‘Thrombolytic within 30 minutes of arrival.’ They found these measures, as a group, to be very useful for internal quality improvement and quite useful for external reporting. Several hospitals have implemented systems improvement projects within months of receiving their measurement results.

Case identification needs to be modified to make it a two-step process:

1. Identify cases for review using the ED discharge ICD-9 codes used in the field test
2. Abstract each of the identified cases and include only those cases with documentation of ‘acute coronary syndrome’ or ‘possible AMI’ or ‘probable AMI’

‘ASA within 24 hours of arrival’ is put in Category 2 because the case identification methodology needs to be modified. The data collection tool for aspirin did not include the date and time aspirin administered. The question was a simple yes or no: 1) was aspirin received within 24 hours before hospital arrival, and 2) was aspirin received during this ER stay? Therefore, all 510 eligible cases were included in the denominator for this measure.

‘ECG within ten minutes of arrival’ is put into Category 2 because the case identification methodology needs to be modified. Some expert panel members voiced concern about whether the time cut-off should be longer than ten minutes, though not by hospitals. Both because some hospitals had relatively high results, and because current guidelines suggest ten minutes as a standard, the study team feels comfortable with retaining the ten minute cut-off. None of the 510 eligible cases lacked time of arrival and 43 lacked time of ECG. In the field test these cases with missing time data were excluded from the denominator. The documentation of timing of care is key quality information therefore we recommend the inclusion of these cases in the denominator and the exclusion of them from the numerator.

‘Cardiac blood markers drawn within 10 minutes of arrival’ is put into Category 3 because of the expert panel’s concerns about validity and hospitals’ perception it was not very useful. The expert panel was evenly split between those who thought this measure could be modified and used, those who thought a new approach was needed for this area, and those who believed the timing of blood draws for cardiac markers was not a good area for quality measurement. It is not clear that this measurement area represents a priority area for further work.

‘Thrombolytic administration within 30 minutes of arrival’ is put into Category 2 both because the case identification methodology needs to be modified and because denominator inclusion criteria need to be applied to make the measurement more consistent with the CMS/JCAHO measure similar to this one. The CMS/JCAHO measure requires cases in the denominator show ST segment elevation or left bundle branch block. Adding this requirement will increase the data collection burden for hospitals, but the change is important so that small rural hospitals can be directly compared with other hospitals on this measure. None of the 33 patients who received a thrombolytic lacked time of arrival or time of thrombolytic administration. In the field test if any cases had had missing time data they would have been excluded from the denominator. The documentation of timing of care is key quality information therefore we recommend the inclusion of cases with missing timing information in the denominator and the exclusion of them from the numerator. Appropriate assessment of patient eligibility for reperfusion therapy and timely action to accomplish reperfusion in eligible patients are crucial issues in AMI care at small rural hospitals. This measurement addresses an important aspect of reperfusion management, but additional measurements are needed. A particular issue currently is the decision-making process regarding whether patients are administered a thrombolytic at the hospital or whether they are given no thrombolytic and transferred for PCI. Measurements regarding assessment of reperfusion eligibility, whether eligible patients receive reperfusion, and measures of coordination between hospitals and total time to PCI would complement the measure tested in this project.

‘Time to transfer’ is not useful if applied to all probable/possible AMI patients, because of differences in reason for transfer in this group and because some elements of transfer timeliness (examples: EMS availability and weather issues) are beyond the hospital’s control. For a subset of these patients, such as those transferred for PCI, this measure is promising. The complexity of defining this subset influenced the decision to place this measurement into Category 3 rather than Category 2.

In summary, the Technical Expert Panel placed the ED: Chest Pain/AMI in the following categories:

- ▶ ‘ASA within 24 hours of arrival’ is put in Category 2 because the case identification methodology needs to be modified.
- ▶ ‘ECG within ten minutes of arrival’ is put into Category 2 because the case identification methodology needs to be modified.
- ▶ ‘Cardiac blood markers drawn within 10 minutes of arrival’ is put into Category 3 because of the expert panel’s concerns about validity and hospitals’ perception it was not very useful.
- ▶ ‘Thrombolytic administration within 30 minutes of arrival’ is put into Category 2 both because the case identification methodology needs to be modified and because denominator inclusion criteria need to be applied to make the measurement more consistent with the CMS/JCAHO measure similar to this one.
- ▶ ‘Time to transfer’ is not useful if applied to all probable/possible AMI patients, because of differences in reason for transfer in this group and because some elements of transfer timeliness (examples: EMS availability and weather issues) are beyond the hospital’s control. For a subset of these patients, such as those transferred for PCI, this measure is promising. The complexity of defining this subset influenced the decision to place this measurement into Category 3 rather than Category 2.

ED: Pneumonia – Antibiotics within four hours of arrival

Hospitals had little difficulty identifying cases or correctly abstracting cases. Hospitals had a higher opinion of the usefulness of this measure than the expert panel. Hospitals found the measure to be quite useful for internal quality improvement and somewhat useful for external reporting. Almost all pneumonia patients who received antibiotics in the emergency department received them within four hours (98%). Patients admitted to the hospital were not included (they are included in the parallel inpatient pneumonia measure).

The expert panel believed this measurement should be applied only to pneumonia patients who are admitted to the hospital or transferred to another hospital, because the scientific literature demonstrating improved outcomes for pneumonia patients through timely administration of antibiotics has been limited to admitted patients. Of the 280 pneumonia patients included in this project, 53 were admitted to the hospital and nine were transferred to another hospital.

- ▶ **This measure was placed into Category 4 because it does not represent a priority for further work at this time. However, expanding the parallel CMS/JCAHO inpatient pneumonia measure to include patients transferred to another hospital would increase the volume for the CMS/JCAHO measure at small rural hospitals.**

Emergency Department: Trauma – Monitoring of vital signs

The initial abstraction instructions for this measure proved confusing to the hospitals, resulting in low inter-rater reliability testing. Revised instructions and additional one-on-one training by telephone led to more accurate abstraction. Some abstraction difficulties remained, so additional improvements in abstraction instructions and formatting of the abstraction tool could be

attempted. Though hospitals thought this measure only somewhat useful for internal quality improvement and not very useful for external reporting, they were enthusiastic about having their attention focused on vital signs documentation in the emergency department. They found many opportunities for improvement, and several hospitals have proceeded with educational and process improvement efforts around ED documentation.

The expert panel agreed with the hospitals that the measurement was applied to too broad a range of trauma patients. The panel believed the measurement held promise if it was used for patients with more severe trauma, and they were enthusiastic about how this measure is patient-focused (“Are the doctors and nurses paying attention to me?”). It should be possible to choose a set of trauma ICD-9 codes to define this subset of patients.

- ▶ **Because this set of codes needs to be worked out and some additional improvements in the abstraction methodology are in order, this measure was placed in Category 2 rather than Category 1.**

Transfer Communications

Hospitals were enthusiastic about this measure. They found it to be very useful for internal quality improvement and somewhat useful for external reporting. Several hospitals have proceeded with systems improvements within months of receiving their measurement results. Performing this measurement brought attention to deficiencies in documentation at their facilities. Hospitals did find the abstraction form rather long and time consuming. The first round of inter-rater reliability testing revealed some hospitals were abstracting cases based on what information they believed to be routinely transferred with patients, rather than what was documented as having been transferred (contrary to the written instructions and training). Careful abstraction training and ongoing reinforcement and inter-rater reliability testing are very important for this measure. Abstraction instructions will need to be more detailed and specific than those used in this project.

The measurement needs to be changed to include both information sent with the patient at time of transfer and information communicated to the receiving hospital within a specified period of time. The duration of this interval will need to be set. There does not seem to be an objective parameter for setting the interval: 30 minutes and 60 minutes were suggested as reasonable by the expert panel. The panel felt strongly that such an interval should be included since transfer shouldn't be delayed by the need to gather and organize information.

Modification of the elements in this measure might be needed. The expert panel believed they were not equally important to continuity of patient care. A possible strategy for modifying the measure would be to limit it to a smaller number of elements that are thought to be most important to continuity of patient care. (See Appendix 21 for a comparison of elements used in this field study to CCR elements.)

A metric has not been developed but would be valuable for this measure. The expert panel felt it was not reasonable to expect all transferred patients to achieve all of the 16 elements represented in the measure. Of the 294 patients assessed in this project, 24% achieved all 16 elements, 47% achieved 15 or more, and 66% achieved 14 or more. Because some hospitals noticed immediately some documentation deficiencies they could address, it might be that performance today at the study hospitals would be significantly higher.

In the field test, this measure was applied to three classes of emergency department patients as a matter of convenience (patients whose records were being abstracted for other measures). However, the measure could be applied to transfers of any kind.

► **This measure was placed into Category 2 because of the following recommended changes:**

- 1) The inclusion of information communicated to the receiving hospital within a specified time of transfer,
- 2) The re-evaluation of the specific elements included in the measure,
- 3) The development of more detailed and specific abstraction instructions, and
- 4) The development of a measurement metric.

Cross-Cutting Measure: Advance Directives

Hospitals were able to collect data for this measure without difficulty and with a high degree of accuracy. They found the measure only somewhat useful for internal quality improvement and not very useful for external reporting.

The expert panel acknowledged the time is right to focus on issues related to Advance Directives. The measure used in the field test is useful to assess compliance with existing regulatory and accreditation requirements, but not for public reporting. It doesn't get at the issue of great interest to patients and their families: whether wishes expressed in an advance directive get carried out at the hospital. Though the measure was applied to only a subset of inpatient and emergency department patients for convenience (patients whose records were being abstracted for other measures), it could be applied to a broader range of patients.

► **Though this measure could be used as it is (Category 1), it is of limited usefulness on its own, and would best be used in combination with other measurements to describe more fully whether patients' advance directive wishes are followed**

Cross-Cutting Measure: Medication Teaching

Hospitals were able to collect data for this measure without difficulty and with a high degree of accuracy. They found the measure only somewhat useful for internal quality improvement and not very useful for external reporting.

The abstraction instructions for this measure allowed a case to meet numerator requirements if the record contained a form with a checked box that indicated the patient was instructed on medications at discharge or a printed discharge form signed by the patient stating medication teaching had been done. The expert panel believed this simplistic methodology was not useful for internal quality improvement or for external reporting.

The panel agreed strongly that ensuring patient understanding of medications and other issues at discharge is very important and worthy of further measurement development work. The goal of the measurement should be assessing whether the patient in fact understood and can manage their discharge medication regimen. Because meaningful assessments of patient understanding are likely to be labor intensive, efforts could first be directed to a subset of situations where drug

management might be especially challenging, i.e., patients discharged on a high-risk medication or on a large number of medications.

► **Because a new approach is needed, this measure from the field test is rated Category 3.**

Cross-Cutting Measure: Medication Safety Checklist

Hospitals were able to collect the data on the medication safety checklist with little difficulty. They found the checklist somewhat useful for internal quality improvement and not very useful for external reporting. Several hospitals took action to address missing components of medication safety as identified by the checklist. Some examples include: exploring computer support for pharmacy, allergy lock-outs, and computer generated MAR; increasing hours of pharmacist coverage through telepharmacy and contracting for consulting services with an affiliated hospital.

A scoring metric is not readily apparent for the medication safety checklist because not all the processes have an identified standard.

The panel's discussion showed strong interest in medication safety assessment tools and measurements as a way of promoting and facilitating improvements in this area. Some emphasized the need for measures suitable for comparison to be developed in the very near future. There was consensus that a broad checklist, such as was used in the field test, might be more useful as a road map for internal assessment and planning than for comparative measurement. It might be possible to develop a comparative measure from a small subset of elements used on the checklist: elements that are evidence-based and, ideally, are represented in the Leapfrog Group's 4th Leap and/or the JCAHO Patient Safety Goals. Because one of the chief values of a tool of this kind is educational, it was emphasized that the checklist should include detail on what a hospital needed to do to comply with current standards and guidelines, as well as link the hospital to resources for improvement. The tool needs detailed specifications to facilitate objective responses and a validation methodology needs to be developed and tested.

► **Because of the need for extensive, additional development work, the medication safety checklist is put in Category 3.**

Administrative Measure: Cesarean Section (C-section) Rate

The ten hospitals in this project that provide obstetrical services collected data for this measure. They were able to collect the data without difficulty and found the measure to be not very useful for internal quality improvement and somewhat useful for external reporting.

If a count of C-sections is used, a more detailed definition of what is to be counted as a 'C-section' needs to be provided. One panel member referenced a report that found 27 different ways C-section rate was calculated. Separation of C-section types could provide a better view of care delivery patterns at the hospital; for example, separating primary from repeat C-sections.

Most on the panel thought a different measurement approach was needed, but that it was very important to have measurements for labor and delivery services. An alternative approach would be to determine if cases were managed according to national guidelines (example: ACOG guidelines for C-section eligibility). This approach to measurement would require medical record abstraction and has its own validity challenges. The panel also suggested a variety of other possible approaches for obstetric care measures:

- Is the hospital actively monitoring labor?
- Is there an adequate system (protocols; arrangements with other hospitals) in place to care for an OB case that becomes complicated emergently?
- Obstetrical and neonatal transfer
- Time from ‘decision to incision’ for C-sections

▶ **Because a new approach seems necessary, the ‘C-section rate’ measure is put in Category 3.**

Administrative Measure: Laparoscopic Cholecystectomy Rate

The seven hospitals that have laparoscopic cholecystectomies performed at their facility collected administrative data for this measure. They were able to collect the data without difficulty and found the measure to be not very useful for internal quality improvement and not very useful for external reporting.

The panel was not enthusiastic about this measure. Nearly half the panel members thought this topic was not an important area for comparative measurement. It isn’t clear what a benchmark should be for this measure, since some cholecystectomies are best done as ‘open,’ rather than as laparoscopic procedures, and because some planned ‘open’ cholecystectomies might be done at regional medical centers rather than at the small rural hospitals.

This measure could be put in either Category 3 or Category 4. Though additional developmental work could be done to provide risk-adjustment strategies to refine this measure, there doesn’t appear to be much support for the effort.

▶ **The study team decided to put the measure into Category 4.**

Administrative Measures: Adverse Drug Reaction Rate and Medication Error Rate

Because the issues surrounding these measures are similar, because of similarities in field test results, and because the expert panel discussed these two measures together, they are considered here together.

Hospitals experienced some difficulty collecting data for these measurements. Many of the hospitals were unable to determine the number of doses dispensed or administered in the given time frame to be used for the denominator. Most reported using an incident report system for tabulating medication errors and adverse drug events. Hospitals considered the ‘medication error rate’ measure quite useful for internal quality improvement and not very useful for external reporting. The ‘adverse drug reaction rate’ measure was considered not very useful for either internal quality improvement or external reporting.

There was wide agreement on the expert panel that rates of adverse drug reactions and medication errors were very important areas for measurement, but that before public reporting could be done responsibly, hospital capacity to ascertain errors and drug reactions and medication doses needs to be improved. Work needs to be done urgently to develop and publicize methodologies for surveillance of adverse drug reactions and medication errors that are feasible for hospitals of all sizes. The Institute for Healthcare Improvement’s (IHI) Trigger Tool might be a good place to start.

The panel expressed urgency about developing measures of medication errors and/or adverse drug reactions that are suitable for public reporting, both because health care purchasers are demanding it and because these numbers are important for getting senior managers and board members to pay attention to the issue. Some on the panel felt that deriving a measure from elements of the ‘medication safety checklist’ might suffice for now, as a measure for public reporting.

▶ **Both of these measures are placed in Category 3.**

Administrative Measure: Medicaid Denial Rate

Though all hospitals were asked to do so, only one hospital collected data for this measure, and that hospital indicated difficulty in securing the data from their business office. The hospitals considered this measure not at all useful for internal quality improvement or for external reporting.

Each state Medicaid agency approaches payment denial or admission approval in its own way, making a single national methodology impossible. There was no support for this measure among the panel.

▶ **This measure is placed in Category 4.**

Process Lessons Learned: Recruitment, Training, Technical Assistance, and Expert Panel

The central point in hospital recruitment, training, and technical assistance is that one size does not fit all. Hospitals differ in their measurement capability, which means that recruiting processes must seek to identify the training, support, and technical assistance needs for each hospital.

Communication

A key point in identifying needs is to assure the involvement of both administrators and staff who will be doing the abstracting and measurement in the recruiting phase. A lack of communication between management and front-line workers can result in a shortage of resources and time for abstractors. A conference call during recruitment with the recruiting organization and the hospital decision makers, including health system representatives as indicated, can increase the likelihood that: 1) internal communication is complete, 2) all necessary information has been received by all parties important in the decision, and 3) the decision makers understand that the abstractors should attend the training.

Assess Hospital Needs and Resources

During recruitment, hospital needs and potential hospital burden should be assessed. Following recruitment and before abstraction, the training organization should assist the hospital with an examination of the key elements needed for successful implementation of a chart abstraction project that collects quality related data. Elements needed are: 1) computerized coding system that can be used to identify cases; 2) medical record system that allows for access to chart documentation; 3) charting system that is consistent and clear across patient units to allow for easy location of data elements; 4) sampling technique, if there are large numbers of cases; 5) plan for analysis and interpretation of the data; and 6) plan for use of the data to improve the quality of care provided in the hospital. With these in place, the abstraction process need not be frustrating or overly burdensome, though hospitals may need to identify priority areas and start data collection in targeted areas rather than in all measurement areas.

The individual who attends training is important. The attendees should be staff who will either be the individuals doing the quality measurement or responsible for training those individuals.

Assess Skill Level of Abstractors

The training organization should tailor training to hospital capabilities. Hospitals differ in staff experience and expertise with quality measurement and data collection. It is important to have a sense of existing skill level of attendees before the training sessions so that the sessions are designed to best meet and enhance current skill levels. Assessing trainee skills in advance allows training to emphasize basic or advanced training to suit the audience. Basic training would include extra emphasis on the abstraction process and ways to simplify it. Advanced training can focus on short cuts and nuances. Advanced abstractors should also be encouraged to serve as resources for novice abstractors so they will have better ongoing support.

Create Training Curriculum

It is important to have a consistent reference curriculum for follow-up and one-on-one training for hospital staff that are not able to attend training sessions. Follow-up training by QIO trainers rather than hospital staff will lead to greater consistency and subsequent success.

Inter-Rater Reliability

Assessment of inter-rater reliability is essential for obtaining comparable measurement. It is especially important for new abstractors, or for new measures, to ensure that the elements are consistently and correctly collected. Development of personal relationships between the auditors in the training organization and the abstractors can help facilitate ongoing support and maintain the integrity and reliability of the abstraction process.

QIO Structures

Differences in QIO structures and their relationships with participating hospitals may have an impact on the effectiveness of the training and resulting hospital success with the measures. As further rollout of the measures is considered, it will be important to design QIO resources, responsibilities, relationships with hospitals and formal project training in a manner that encourages ongoing QIO contact, technical assistance, and support.

Expert Panel

Following are some observations and lessons learned during recruitment of the expert panel members and the face-to-face expert panel meeting.

- Include all data collection tools and help documentation for new measures in pre-planning packet of information. Many participants questioned how certain variables were collected and what information the hospitals used while they were collecting the data. In the interest of overwhelming the expert panel members, we chose to send less rather than more.
- At the panel meeting, explain inter-rater results more thoroughly – process, analysis, and results. The panel members wanted to be assured the data was reliable and accurate and had been abstracted consistently across all hospitals.
- Allow more time overall for the face-to-face meeting. The time allotted was extremely tight and discussion had to be cut short at times to keep the agenda on time. The meeting was scheduled to allow members to fly in the morning of the first day. In retrospect, two full days, rather than 1-1/2 days would probably have worked better.
- Allow more time for introductions and the project overview. Members had many questions about the project process steps, such as data collection and inter-rater reliability. These needed to be responded to before the agenda could be moved forward.

Next Steps

This project has demonstrated that relevant quality measures can be systematically collected from rural hospitals that receive appropriate training and support from QIOs. Furthermore, many of the hospitals in the field test used this information to take actionable steps related to quality improvement in their facilities. The success of these initial efforts as well as the current health care environment emphasis on standardized measure sets, public reporting, performance-based payment strategies, and QIO technical assistance underscores the importance of continuing the rural hospital quality work initiated in this project.

Relevant next steps include:

- **Measure Development** – The positive response from rural hospitals to the transfer communication measures suggests the need for developing additional measures related to areas such as transfer communication back from larger referral hospitals, pre-hospital transfer communication from primary care physicians and EMS, timeliness of patient transfers, and transfer patient outcomes. Additional areas for refinement of the existing measure set include adaptation of the inclusion criteria for ED chest pain/AMI measures, risk/severity adjustment of ED pneumonia and ED trauma monitoring measures, and the development of standardized systems for identifying, documenting and measuring medication errors and adverse drug reactions. Finally, new areas identified by the TEP as relevant for small rural hospitals include measures related to pain management, EMS, continuity of care across all settings, and swing bed care.
- **Training and Support Model Development** – The new CAH/Rural Hospital sub-task in the about to be implemented 8th Scope of Work for QIOs highlights the need for new training and support models that facilitate quality improvement in rural hospitals. These models should focus on building state capacity to stimulate rural hospital activities related to quality measurement, data collection, data reporting, and internal and external uses of quality data. Key organizations that could be involved with state capacity building include QIOs, State Offices of Rural Health, State Flex programs, and State Hospital Associations. State partnerships for these efforts can be formed based on the above organizations' level of interest, level of involvement with rural hospitals, and level of experience with quality measurement and quality improvement processes.
- **Coordination with Other Quality Measurement and Improvement Efforts** – Future work by our team on additional relevant measures related to patient transfers could continue to support efforts to ensure that the scope of work for QIOs is relevant to small rural hospitals. This work should be coordinated with the quality measurement and improvement efforts of other groups (e.g., the National Ambulatory Care Quality Alliance who recently adopted measures for outpatient care).
- Further work on defining relevant quality measures for rural hospitals should help stimulate the ongoing participation of CAHs and other rural hospitals in public reporting initiatives at the national level (e.g., the Hospital Quality Alliance), benchmarking efforts at the regional level supported by hospital networks (e.g., Rural Wisconsin Health Cooperative), and internal quality improvement activities that involve individual hospital staff, management and boards. In addition, the pay-for-performance movement has not embraced rural hospitals in the large majority of initiatives that have been recently

implemented. The use of performance measures that are relevant to smaller scale institutions and the design of strategies to improve statistical estimates based on small volumes are necessary steps to facilitate rural hospital participation in pay-for-performance initiatives.

The recent Institute of Medicine report, “Quality through Collaboration: The Future of Rural Health,” concludes that rural America can lead in testing strategies for improving population health and personal healthcare delivery. The work agenda described above highlights the potential that rural hospitals have to lead emerging initiatives in quality measurement and reporting, particularly in areas related to patient transfers, continuity of care across settings, and timeliness of emergency department care.

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