

Measuring Rural Hospital Quality

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ABSTRACT: *Context:* Increased interest in the measurement of hospital quality has been stimulated by accrediting bodies, purchaser coalitions, government agencies, and other entities. *Purpose:* This paper examines quality measurement for hospitals in rural settings. We seek to identify rural hospital quality measures that reflect quality in all hospitals and that are sensitive to the rural hospital context. *Methods:* We develop a conceptual model for measuring rural hospital quality, with a focus on the special issues posed by the rural hospital context for quality measurement. With the assistance of a panel of rural hospital and hospital quality measurement experts, we review hospital quality measures from national and rural organizations for their fit to rural hospitals.

Findings: Based on this analysis, we recommend an initial core set of quality measures relevant for rural hospitals with less than 50 beds. This core set of 20 measures includes 11 core measures from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) related to community acquired pneumonia, heart failure, and acute myocardial infarction; 1 measure related to infection control; 3 measures related to medication dispensing and teaching; 2 procedure-related measures; 1 financial measure; and 2 other measures related to the use of advance directives and emergency department monitoring of trauma vital signs. *Conclusion:* Based on the special measurement needs posed by the rural hospital context, we suggest avenues for future quality measure development for core rural hospital functions (eg, triage, stabilization, and transfer, and emergency care) not considered in existing quality measurement sets.

In recent years, there has been increased interest in the measurement of hospital quality through measures of clinical processes and outcomes.¹ Accreditation organizations have proposed new measurement strategies based on core measures²; purchaser coalitions have pushed for the adoption of new hospital quality measures and systems^{3,4}; government agencies have developed algorithms for measuring hospital performance using discharge data⁵; and the National Quality Forum, a voluntary consensus standard-setting organization, has developed a performance measurement set for hospitals in the US.⁶

Some organizations, such as the Rural Wisconsin Health Cooperative (RWHC) and ApplesToApples (A2A), have proposed quality measurement systems specific to rural hospitals.

The multitude of measures and measurement systems can lead to confusion about what and how to measure quality. This has been addressed in part by work groups composed of representatives from a broad range of organizations reviewing and standardizing measures.⁶ This paper extends this work by addressing the special issues related to rural hospital quality measurement.

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Conceptual Model for Measuring Rural Hospital Quality

STRUCTURE		PROCESS		OUTCOMES
<ul style="list-style-type: none"> • Physical Characteristics <ul style="list-style-type: none"> ➢ Facilities <ul style="list-style-type: none"> ▪ Surgery ▪ Radiology ▪ Pharmacy ▪ Swing Beds • Financial Characteristics <ul style="list-style-type: none"> ➢ Capitalization ➢ Profitability • Staffing <ul style="list-style-type: none"> ➢ Nurse Staffing <ul style="list-style-type: none"> ▪ Training ▪ Level ➢ Physician Staffing <ul style="list-style-type: none"> ▪ Training ▪ Level ➢ Pharmacist Staffing <ul style="list-style-type: none"> ▪ Available Hours 	<p>↔</p>	<ul style="list-style-type: none"> • Conditions <ul style="list-style-type: none"> ➢ AMI <ul style="list-style-type: none"> ▪ Time to Aspirin • Unit <ul style="list-style-type: none"> ➢ Pharmacy <ul style="list-style-type: none"> ▪ Dosage Error ▪ Drug Interaction Error ➢ ER <ul style="list-style-type: none"> ▪ Time from Trauma to Care Delivery ▪ Care during Transportation ▪ Waiting Time in ER • Function <ul style="list-style-type: none"> ➢ Discharge Planning and Communication 	<p>↔</p>	<ul style="list-style-type: none"> • Health Status <ul style="list-style-type: none"> ➢ Condition Specific <ul style="list-style-type: none"> ▪ Mortality ▪ Morbidity <ul style="list-style-type: none"> – Bed Sores – Transfusion Reaction – Post-operative Infection ➢ Patient Specific <ul style="list-style-type: none"> ▪ Activities of Daily Living ▪ Medical Outcomes Study 36-Item Short Form Questionnaire • User Evaluation <ul style="list-style-type: none"> ➢ Satisfaction with Care

Adapted from Campbell et al.⁷

This paper examines quality measurement for hospitals in rural settings. We seek to identify rural hospital quality measures that reflect quality in all hospitals and that are sensitive to the rural hospital context. First, we develop a conceptual model for measuring rural hospital quality. Second, we summarize the special issues identified in the literature that are posed by the rural hospital context for quality measurement. Third, with the assistance of a panel of rural hospital and hospital quality measurement experts, we review previously developed hospital quality measures from national and rural organizations for their fit to rural hospitals. Based on this analysis, we recommend an initial core set of quality measures relevant for rural hospitals with less than 50 beds. Finally, based on the special measurement needs posed by the rural hospital context, we suggest avenues for future quality measure development and discuss our current efforts to field test the feasibility of collecting and using hospital quality measures relevant to the rural environment.

Model for Measuring Rural Hospital Quality

We define rural hospital quality as the degree to which organizational structures and processes increase

the likelihood of positive health outcomes for individuals. Campbell et al⁷ define quality of care as “whether individuals can access the health structures and processes of care which they need and whether the care received is effective.”⁷ A high-quality rural hospital has in place those structures and processes that maximize individual quality of care. In a high-quality rural hospital, aspirin will be administered quickly to those presenting with an acute myocardial infarction (AMI). In a high-quality rural hospital, patients who cannot be treated with the services available in the rural hospital are quickly and accurately identified and transported to a location where they can receive the services they need.

Rural hospital quality can be measured with structure, process, and outcome measures (Figure).⁷⁻⁹ Structure refers to the facilities, staffing, and organization of the rural hospital. It refers to the types of services that the rural hospital is equipped to provide (eg, thrombolysis); the types of professionals available to deliver services (eg, staffing levels for nurses and physicians); the types of infrastructure to support work (eg, systems for the storage, distribution, and administration of high-risk medications); and the types of rules, norms, or culture that govern interaction (eg, norms that support discussing errors openly).

Although research may show a correlation between structure and outcomes,¹⁰ the effect of these structural elements occurs through rural hospital processes. Processes are “the actual delivery and receipt of care”⁷ or those activities supporting the delivery and receipt of care. Processes can be divided into technical and social components, with technical referring to doing the right thing at the right time (eg, providing aspirin quickly to those with an AMI) and social referring to the interaction with the patient (eg, obtaining informed consent). Outcomes are the consequences that patients experience; their mortality; morbidity (eg, nosocomial and postoperative infections); and perceptions of the care process (eg, satisfaction with care delivery).

Structure, process, and outcome measures provide an important perspective on how quality should be measured. It also is important to consider what aspects of rural hospital quality should be measured. Potential measures come in a broad range, including measures of clinical processes for specific conditions (eg, aspirin at arrival for AMI); counts of complications or errors (eg, medication errors); rates of use of specific procedures (eg, Cesarean sections); and mortality rates. Many of these measures have also been developed in priority-setting exercises focused on urban hospitals, which may not include measures important to rural hospitals (eg, patient triage and transfer).

The goal of this research is to examine the important issues for measuring rural hospital quality and to define a set of quality measures that are relevant to rural hospitals. We first reviewed literature on quality measurement,^{7,11,12} rural hospital context,¹³ and quality¹⁴⁻¹⁶ to identify questions related to rural hospital quality measurement. To review specific quality measures, we identified quality measures commonly used in national quality measurement efforts or used by rural hospitals. We then asked a panel of experts in rural health care, rural hospitals, and quality measurement to review and rate the specific hospital quality measures for their relevance to rural hospitals and to then meet in person to review and discuss the issues raised by the literature review and to review their ratings. The 13-member expert panel included representatives from key national quality organizations as well as rural health professionals and employers knowledgeable about quality issues. In the discussions with the panelists, we asked them to assume the context of a rural hospital of less than 50 beds.

Rural Hospital Quality Measurement Issues

At their in-person meeting, the expert panel addressed what issues are important in measuring rural

hospital quality by focusing on the following questions identified by our literature review:

- How do rural and urban hospital contexts differ?
- What should be the balance between measuring units (eg, laboratory, pharmacy); processes (eg, infection control); and specific conditions (eg, treatment for AMI)?
- Is it best to measure a few units, processes, or conditions in depth, or is it better to measure a broad range of units, processes, or conditions, each with only a few measures?
- Are there significant types of measures that are important for measuring rural hospital quality that are not included in existing measurement sets?
- What should be the relative emphasis of measurement—supporting process improvement, benchmarking, and/or report cards?
- How should the limited patient volume of many rural hospitals be addressed in quality measurement efforts?

The discussion of these issues helped frame the rural hospital context for quality measurement issues for the expert panel members prior to their final ratings. Our interpretation of the panel’s discussion is summarized below. This interpretation is based on the comparison of notes of the discussion written independently by 3 of the authors, summarized by the authors, and then reviewed by all panel members.

Rural Hospital Context

There was agreement about the importance of quality measures of appropriate clinical care (eg, providing aspirin for an AMI) and the support of a culture of collaboration where it is safe to discuss problems, near-misses, and errors in both rural and urban hospitals. In addition, a number of rural-specific quality measurement issues were identified.

Rural Hospitals Are Smaller, Less Complex, and Rely More on Generalists. Rural hospitals tend to be smaller, perform a smaller variety of procedures, 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. This results in a stronger reliance on staff who deal with conditions on an intermittent, irregular basis, or with staff performing functions that would be performed by more specialized individuals in a larger hospital. Examples of support systems for the rural hospital context, which could be used as quality measures, are the presence of protocols

for AMI on emergency room walls, the use of those protocols, and refresher training for infrequently encountered conditions. Another example is the support provided for a rural hospital nurse mixing an IV drug solution late at night because a pharmacist is not available in the hospital. Quality measurement in this case needs to focus on the types of support and protocols available for the nurse mixing drugs. Because of the smaller size, reduced complexity, and reliance on generalists, quality measurement needs to capture how well a rural hospital supports and provides care given by generalists.

Resource Environments Are Constrained and Diverse. Rural hospital resource environments are more constrained than urban hospitals', and there is also substantial diversity across rural communities. This includes the availability of personnel (eg, registered nurses) and other types of health care organizations (eg, nursing homes). These contextual differences affect rates of hospital use and possibly readmission rates. The availability of other types of institutions, such as nursing homes, may be a determinant of different patterns of hospital use in rural areas than in urban areas.^{17,18} The implication is that rural hospital quality is influenced by contextual issues that are addressed both by broad public policy and hospital action and by the ability of a rural hospital to adapt to its local context, organizing scarce resources in the best manner possible. The implications for quality measurement are the following:

- Quality measurement systems need to measure contextual features actionable through public policy, such as personnel availability, so that policy makers can take action to address the contextual feature that affects quality (eg, nursing and pharmacist shortages in rural areas).
- Quality measurement systems need to measure the quality of work a rural hospital does with the resources available to it. In other words, it may be necessary to make quality measurement conditional on the hospital context.

Rural Hospital–Community Linkages. Because of their location in smaller communities and the greater likelihood that they are the only hospital in the community, it is easier for rural hospitals to play a key role in organizing community health care. A high-quality rural hospital can work with the community to build integrated community care systems and help develop an interdisciplinary team that can fit health care to the local environment. An example is a rural hospital building linkages with local health departments to develop community-based care

programs or working with local physicians to recruit physicians to the community.

Rural Hospital–Referral Center Linkages. The rural hospital serves as a link between rural residents and urban care facilities, particularly after patient stabilization. This is a consequence both of the rural hospital's location and the more limited range of services it provides. Because of its role in linking residents to urban referral centers, triage and transfer decision-making about when to provide a particular type of care, transporting patients, and coordinating information flows to specialists beyond the community are important aspects of rural hospital quality.

Potential problems include specialists beyond the community delaying appointments, inaccurately or incompletely sharing information, and being dismissive of rural practitioners. Implications for quality measurement are the following:

- A high-quality rural hospital will have protocols to guide treatment or referral decisions and develops systems to share information with specialists beyond the community.
- Rural hospitals are difficult to consider as completely contained units for measurement purposes because of the linkages with the community and specialists beyond the community. Measuring quality in rural hospitals can be more difficult because episodes of care may span multiple locations.

Principles for Measuring Rural Hospital Quality

Focus on Conditions and Processes. It was recommended to focus quality measurement on processes and conditions, rather than hospital units, because measuring conditions and processes captures how well units work together and can measure integration of care across units. Examples of conditions and processes that cross unit boundaries are diabetic care, infectious disease management, and antibiotic prescribing. Within conditions, measurement should focus on conditions prevalent in rural hospitals, particularly on points in care delivery where action could lead to significant care improvement or error reduction, such as cardiac monitoring processes. An important advantage of process measurement can be its clear linkage to quality improvement efforts.

Although measuring at the unit level provides some advantages, they are offset by significant risks. Unit measurement can identify potential problems within "silos," such as surgery and pre- and postoperative care, and is consistent with managerial budgeting and

evaluation processes. However, unit measurement may foster a silo mentality among hospital staff and lead to lower integration across units. Using a functional approach and selecting sets of processes to measure may allow both unit performance and integration to be jointly measured.

Trading Off Breadth and Depth. There is value in measuring broadly, such as a variety of indicators for a particular episode of care for a condition, because it provides an overall measure of quality. But broad measurement is difficult when measures for an episode of care are obtained from multiple sites. This may result in less reliable measurement, particularly when some of the care sites are not within a rural hospital's control. A broad measurement set is best used for episodes of care when a rural hospital has relatively good control of the complete episode of care, such as pneumonia. When a rural hospital has less control over an episode of care, such as AMI or trauma where the patient is more likely to be stabilized and transferred, using more targeted measures is more appropriate.

Benchmarking, Report Cards, and Quality Improvement. Developing a relevant set of measures that apply to most rural hospitals is valuable because it will support benchmarking and comparison across hospitals. If the measures are stable and consistent over time, they can be used to measure and support quality improvement. Relevant measures should be relatively easy to measure, and there should be an infrastructure available—such as support from quality improvement organizations (QIOs)—to support rural hospital measurement processes in a timely manner. These measures may be useful for targeting improvement in particular aspects of rural hospital quality that are central to the operation of the hospital.

Relevant measures should include items that every rural hospital should be doing well. An example is the proportion of nonneonate pneumonia patients who receive oxygenation assessment with arterial blood gas (ABG) or pulse oximetry within 24 hours of hospital arrival. For comparison purposes and benchmarking, quality measures should be relevant for specific subgroups of rural hospitals that may differ significantly in their context and the services they provide.

Rural Hospital Quality Measurement Gaps. There are a variety of gaps in measuring rural hospital quality in existing hospital quality measurement sets. These gaps involve roles and functions that are important for rural hospitals and include the following:

- A lack of measures that capture the initial contact role of rural hospitals and their triage and transfer responsibility. Relevant measures could reflect (1) decision-making and protocol availability and their use in decisions about where to treat a patient; (2) processes for stabilizing and transporting patients; and (3) care integration with referral hospitals and other care delivery systems.
- A lack of measures that capture linkages within communities. The scarce resource environment in many rural communities requires more integration and coordination to provide effective care, and these linkages provide an opportunity for integrating the continuum of care within rural communities. Relevant measures could reflect (1) the appropriateness of information transfer with other local community providers (eg, local health department) and (2) care integration with other local community providers.

Patient Volume. The low prevalence of many conditions implies that developing reliable measures of rare events (eg, condition-specific rates, specific procedure volume rates, or mortality rates) is extremely difficult in rural hospitals. The difficulty in obtaining reliable measures suggests that these measures are difficult to use for benchmarking or report cards. It also implies that whole measurement classes, such as those related to volume, may not be precise and reliable enough to be useful for comparisons among rural hospitals.

Although low volume makes the construction of some detailed, condition-specific measures unrealistic, the events can still provide useful information. One alternative is identifying these events for root cause analyses and quality improvement efforts. Sharing of this data with similar rural hospitals may support collaborative learning that improves care delivery. Another alternative is to aggregate measures across conditions (eg, instead of pneumonia-specific prescribing error rates, calculate prescribing error rates across all medical conditions). Although the lower precision of the measure may make it less useful for report cards, it could be useful for quality improvement by monitoring time trends within a rural hospital. It also may be useful for benchmarking care processes across hospitals.

Developing Quality Measures Relevant for Rural Hospitals With Less Than 50 Beds

To identify potential measures of rural hospital quality, we focused on measurement sets from major national organizations or measurement sets that are predominantly used by rural hospitals. The national

measurement sets include those from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO),¹⁹ the National Quality Forum (NQF),²⁰ the Center for Medicare and Medicaid Services (CMS),²¹ and the Agency for Healthcare Research and Quality (AHRQ).²² Organizations that have developed systems frequently used by rural hospitals for quality measurement include the RWHC,²³ A2A,²⁴ the Georgia Hospital Association's Collaborative Approach to Resource Effectiveness (CARE),²⁵ and the Maryland Hospital Association's Quality Indicator Project (Qi Project).²⁶ There were 346 quality measures contributed from the above 8 organizations.

The list of measures considered by the expert panel did not include all of the measures from each of the organizations. Duplicate or similar measures were excluded. For example, some AMIs, heart failure, pregnancy, and community-acquired pneumonia measures are very similar across measurement systems. For those diagnoses, a generic version of the measures was included. Additionally, only some of the examples of average length of stay, volume, admission rate, and other types of measures were included. For example, volume measures related to coronary artery bypass graft (CABG) and esophageal resection were not included because these surgeries are not likely to occur in small rural hospitals.

From the original list of 346 measures, we excluded 58 duplicate measures. The remaining list of 288 measures was too long for the stakeholder panel to review and rate. The measures were sorted into 13 categories based on a content analysis, were examined for similarities, and were compared with the most common types of services, admissions, and procedures in rural hospitals to determine the most appropriate measures for the panel's review. The 13 categories were diagnosis-specific conditions, medication management, infection and infection control, surgical complications, emergency room, mortality rates, admission rates, procedure rates, volume, length of stay, employee health, financial, and other. A subset of 68 measures was selected across the 13 categories, including 1 measure that included several aspects of surgical prophylaxis. Each of these measures was previously identified as a relevant hospital quality measure through a consensus technique used by a major national organization or rural organization.

The 13-member expert panel reviewed the list of 68 quality measures prior to their in-person meeting and assessed their relevance for rural hospitals with less than 50 beds based on 4 criteria:

- the prevalence (of the condition) in small rural hospitals,
- the ease of data collection effort,
- the internal usefulness of the measure for small rural hospitals, and
- the external usefulness for small rural hospitals.

We selected these criteria after reviewing the criteria that various organizations and measurement systems had used in choosing measures.²⁷⁻³¹

Panel members were asked to rate each of the 68 measures on a 5-point Likert scale for each of the 4 criteria. Panel members returned their ratings via e-mail prior to the in-person meeting, and mean ratings and standard deviation of the ratings were shared with the panel to support their discussion.

The expert panel recommended that the final set of quality measures selected to be relevant for rural hospitals with less than 50 beds must be useful for internal (eg, quality improvement) and external (eg, benchmarking) purposes. To select measures relevant for quality improvement within a rural hospital, we identified measures that the expert panel, on average, rated higher than 4 on the 5-point scale for internal usefulness and higher than 3 on the 5-point scale for prevalence (or classified as a sentinel event that could lead to serious health consequences). The ratings were relatively stable across expert panel members. The coefficient of variation (ie, ratio of standard deviation of rating to the mean rating) was greater than .5 for only 10 of the 68 ratings of prevalence and never greater than .5 for the internal or external usefulness ratings.

This process identified 20 measures including 10 core JCAHO measures related to community-acquired pneumonia, heart failure, and AMI; 1 measure related to infection control; 3 measures related to medication dispensing and teaching; 2 were procedure-related measures; 2 were financial measures; and 2 other measures related to the use of advance directives and the monitoring of emergency room trauma vital signs (measures related to non-emergency room AMI care, such as AMI care provided beyond initial treatment, were excluded).

A similar process (which used the external usefulness criterion in place of the internal usefulness criterion) identified 15 measures relevant for external reporting of rural hospital quality. Of note, 14 of the 15 measures on the external usefulness list also were on the above list of 20 measures that were rated to have internal usefulness for rural hospitals.

The combined list of 21 quality measures rated high on internal or external usefulness for rural hospitals with less than 50 beds and high on prevalence were then reviewed again by the expert panel. The only change

recommended by the panel was the removal from the list of the measure of total pharmaceutical drug costs for the month per inpatient days and outpatient equivalents. After extensive discussion, the panel did not believe this financial indicator was a valid measure of hospital quality. The final list of 20 relevant quality measures for rural hospitals with less than 50 beds—with an indicator of their external and/or internal usefulness, data collection strategy and measurement sources—is shown in the Table. The types of quality measures rated most relevant for rural hospitals with less than 50 beds include those related to emergency care, medication management, diagnosis-specific conditions, and infection and infection control. Fourteen of the 20 measures come from national measurement sources and also are relevant for urban hospitals. Six of the measures come from measurement sets predominantly used by rural hospitals (i.e. A2A, RWHC) and may also be relevant for urban hospitals.

Next Steps

Although rural and urban hospitals share similar types of opportunities and challenges for organizing high-quality care, the relative importance of opportunities and challenges varies as a function of the hospital context. The initial work completed in this study identified the most relevant quality measures for rural hospitals with less than 50 beds from *existing* quality measurement systems. Based on our review of the literature and the expert panel discussion, future emphasis needs to be placed on developing relevant quality measures for core rural hospital functions (eg, triage, stabilization, and transfer, and emergency care) *not* considered in existing measurement sets. The example below discusses in more detail the measurement issues related to the triage, stabilization, and transfer processes.

Measurement Issues Related to the Triage, Stabilization, and Transfer Process. Although triage, stabilization, and transfer are important in all hospitals, they are particularly important in rural hospitals. Because of their size, rural hospitals are less likely to be able to provide more specialized services. Because of their location, individuals needing care may be at a greater distance from a rural hospital, and rural hospitals are at a greater distance from facilities with specialized services. This means that decision-making surrounding time-sensitive treatments requiring specialized care may be more difficult. These size and geographic realities increase the importance of organizing triage, stabilization, and transfer in rural

hospitals. This suggests that measurement of these processes is an important issue for rural hospitals. Because of more limited services, the challenge of managing situations where patients present with conditions that the rural hospital does not have the personnel and facilities to treat takes on increased importance in rural hospitals. Structural measures of the triage, stabilization, and transfer process include the presence of triage and transfer protocols; process measures include the timeliness and appropriateness of transfers (ie, Was an appropriate transfer decision made in a timely fashion?); and outcome measures include patient mortality, as well as patient or caregiver evaluations of involvement in the triage decision.

Although measuring triage, stabilization, and transfer decision processes within rural hospitals can reflect what the rural hospital does given patient presentation, it does not capture how quickly the patient presents. Since rural emergency medical services often face economic and geographic constraints, there may be higher fatality rates because of difficulty in getting an emergency patient to a hospital in a timely fashion.³² Research suggests that this problem can be addressed with coordinated trauma systems among rural hospitals.^{33,34} Because of their importance in the local community, rural hospitals have the opportunity to take a leadership role in organizing emergency medical services (EMS). This suggests that a useful structural measure of rural hospital quality would be involvement in the development of coordinated trauma systems or integration with local EMS and ambulance services. Useful process measures could include local EMS response time and the communication of a complete set of appropriate patient data from EMS teams to the rural hospital so that the hospital is prepared to treat the arriving patient.

Working with EMS involves the flow of patients to the hospital. The flow of patients to referral centers is equally important during the transfer decision-making process. Because of the smaller size and catchment volume of rural hospitals, some conditions are likely to present on a relatively rare basis. For these cases, communicating with specialists at referral hospitals is likely to be an important component of the decision-making process, with consultation and information flow being particularly important. Process measures of communication to support the stabilization and transfer decision-making process could measure the quality of communication between the hospitals, including the transmission of a complete drug list and transfer note that contains information on patient history, physical, and reason for admission to the referral hospital. In addition to patient mortality,

Quality Measures Relevant for Rural Hospitals With Less Than 50 Beds¹⁹⁻²⁶

Measure	Use Internally, Externally, or Both	Data Collection Strategy	Measurement Sources*
1. Proportion of acute myocardial infarction (AMI) patients with ST elevation on electrocardiogram whose time from hospital arrival to thrombolysis was 30 minutes or less	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF
2. Proportion of AMI patients without aspirin contraindications who received aspirin within 24 hours before or after hospital arrival	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF, CMS
3. Proportion of AMI patients without beta-blocker contraindications who received a beta-blocker within 24 hours after hospital arrival	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF, CMS
4. Proportion of heart failure patients with left ventricular systolic dysfunction, without angiotensin converting enzyme (ACE) inhibitor contraindications, who were prescribed an ACE inhibitor at hospital discharge	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF
5. Proportion of heart failure patients with documentation in the hospital record that left ventricular function was assessed before arrival, during hospitalization, or was planned for after discharge	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF, CMS
6. Proportion of heart failure patients with a smoking history who received smoking cessation advice or counseling during the hospital stay	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF
7. Proportion of heart failure patients with documentation that they or their caregivers were given written discharge instructions or other educational material addressing all of the following: (1) activity level; (2) diet; (3) discharge medications; (4) follow-up appointment; (5) weight monitoring; (6) what to do if symptoms worsen	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF
8. Proportion of pneumonia patients who received their first dose of antibiotics within 4 hours after hospital arrival	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF, CMS
9. Proportion of nonneonate pneumonia patients who received oxygenation assessment with arterial blood gas (ABG) or pulse oximetry within 24 hours of hospital arrival	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF, CMS
10. Proportion of pneumonia inpatients over age 65 who were screened for pneumococcal vaccine status and were not vaccinated because of refusal or contraindication, or needed vaccine and received it prior to discharge	Both	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF, CMS
11. Proportion of pneumonia patients or their caregivers who have a history of smoking and who received smoking cessation advice or counseling	Externally	Chart review	A2A, RWHC, JCAHO, MD, CARE, NQF

Continued

Measure	Use Internally, Externally, or Both	Data Collection Strategy	Measurement Sources*
12. Proportion of surgical patients with appropriate timing and selection of prophylactic antibiotics for procedures. Measures include (1) antibiotic administration within 1 hour of surgery; (2) antibiotic administration discontinued within 24 hours of surgery; and (3) selection of the appropriate antibiotic	Both	Chart review	NQF, A2A, MD
13. Proportion of medication doses reported as medication errors on the hospital variance/incident report. Error is defined as 1 of the following: wrong patient, wrong dose, wrong time (includes omitted dose), wrong route, and wrong medication	Internally	Internal reporting system	RWHC, A2A
14. Proportion of patients (or their caregivers) with regularly scheduled medications that can demonstrate an understanding of their medication regimen (examples are heart failure or diabetic patients)	Both	Internal reporting system	A2A, RWHC
15. Proportion of discharges that have documented adverse drug reactions for the month (any unwanted or unintended effect)	Internally	Internal reporting system	A2A
16. Proportion of trauma patients with systolic blood pressure, pulse rate, and respiratory rate documented on arrival to the emergency department and at least hourly for 3 hours (or until emergency room patient is released, admitted, or transferred)	Internally	Chart review	A2A
17. Total number of Medicaid denials of admissions and/or continued stays for the month per total Medicaid admissions	Internally	Administrative data	A2A
18. Proportion of all births that are delivered by Cesarean section	Both	Administrative data	AHRQ, NQF, MD, CARE
19. Number of laparoscopic cholecystectomies per total cholecystectomies	Internally	Administrative data	AHRQ, RWHC
20. Proportion of adult admits with complete advance directives for patients 18 years and above and emancipated minors for the month	Internally	Chart review	A2A

* A2A indicates ApplesToApples; RWHC, Rural Wisconsin Health Cooperative; JCAHO, Joint Commission on Accreditation of Healthcare Organizations; MD, Maryland Hospital Association Qi Project; CARE, Georgia Hospital Association CARE; NQF, National Quality Forum; CMS, Centers for Medicare and Medicaid Services; AHRQ, Agency for Healthcare Research and Quality.

outcome measures could include rural physician evaluation of the information exchange process.

Feasibility of Collecting and Using Quality Measurement Data Relevant for Rural Hospitals With Less Than 50 Beds. The ability of rural hospitals to build an infrastructure that supports relevant quality

measurement is essential to their future viability. Most rural institutions will need help in their efforts to develop quality measurement systems that are internally useful for clinical staff, management, and the board, as well as externally useful for payers, purchasers, and accrediting bodies. This support can be provided by a range of entities including QIOs, state

hospital associations, health care systems, and health care networks.

An important next step is to field test the feasibility of collecting and using the set of quality measures relevant for rural hospitals with less than 50 beds. Our study team currently is collaborating with Stratis Health, the QIO for Minnesota, and HealthInsight, the QIO for Utah and Nevada, on an 18-month project funded by CMS to:

- develop measures not included in existing quality measurement sets that are relevant for core rural hospital functions (eg, triage, stabilization, and transfer, and emergency care),
- field test the collection of relevant quality measures from a total of 25 to 30 rural hospitals with less than 50 beds in Minnesota, Utah, and Nevada, with technical assistance and support from the QIOs on measure specifications and definitions and data collection tools and protocols, and
- assess strategies for how the above quality measurement data can be used to improve quality for rural Medicare beneficiaries.

Key issues that will be examined in the field test include the ease of data collection, the usefulness of the data for quality improvement within the hospital, and the usefulness of the data for CMS external reporting needs. The ease of data collection is a salient issue given the current efforts of AHA, CMS, NQF, and others that encourage and provide incentives for the measurement of the quality of hospital care. Our study team is developing strategies that (1) enable individual rural hospitals to collect a subset of the quality measures that are most relevant for their institutions and (2) minimize the number of records necessary for medical record abstraction. We also are encouraging rural hospitals to take full advantage of using quality measures they already are collecting for the current AHA and CMS initiatives. Our goal is to help rural hospitals with less than 50 beds to start building quality measurement capacity in small definable parts and experience the value of using quality data for internal and external purposes before they expand the scope and sophistication of their quality measurement system to include measures not considered in existing measurement sets, such as those related to the triage, stabilization, and transfer process.

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