

*Flex Monitoring Team Briefing Paper No. 13*

# **Analysis of CAH Inpatient Hospitalizations and Transfers: Implications for National Quality Measurement and Reporting**

**October 2006**



A Performance Monitoring Resource for  
Critical Access Hospitals, States, and Communities

**Flex  
Monitoring  
Team** | **University of Minnesota  
University of North Carolina at Chapel Hill  
University of Southern Maine**

**The Flex Monitoring Team** is a consortium of the Rural Health Research Centers located at the Universities of Minnesota, North Carolina at Chapel Hill, and Southern Maine. Under contract with the federal Office of Rural Health Policy (PHS Grant No. U27RH01080), the Flex Monitoring Team is cooperatively conducting a performance monitoring project for the Medicare Rural Hospital Flexibility Program (Flex Program). The monitoring project is assessing the impact of the Flex Program on rural hospitals and communities and the role of states in achieving overall program objectives, including improving access to and the quality of health care services; improving the financial performance of Critical Access Hospitals; and engaging rural communities in health care system development.

This report was prepared by Michelle Casey M.S., Senior Research Fellow University of Minnesota Rural Health Research Center and Michele Burlew, M.S., Episystems, Inc., under contract with the University of Minnesota Rural Health Research Center.

Andy Coburn of the University of Southern Maine provided helpful input on a previous draft of the report.

Questions regarding the report should be addressed to: Michelle Casey 612-623-8316 mcasey@umn.edu.

**Flex Monitoring Team**  
<http://www.flexmonitoring.org>

**University of Minnesota**  
Division of Health Services Research & Policy  
420 Delaware Street, SE, Mayo Mail Code 729  
Minneapolis, MN 55455-0392  
612.624.8618

**University of North Carolina at Chapel Hill**  
Cecil B. Sheps Center for Health Services Research  
725 Martin Luther King Jr. Boulevard, CB #7590  
Chapel Hill, NC 27599-7590  
919.966.5541

**University of Southern Maine**  
Muskie School of Public Service  
PO Box 9300  
Portland, ME 04104-9300  
207.780.4435

### **The Medicare Rural Hospital Flexibility Program**

The Medicare Rural Hospital Flexibility Program (Flex Program), created by Congress in 1997, allows small hospitals to be licensed as Critical Access Hospitals (CAHs) and offers grants to States to help implement initiatives to strengthen the rural health care infrastructure. To participate in the Flex Grant Program, States are required to develop a rural health care plan that provides for the creation of one or more rural health networks; promotes regionalization of rural health services in the State; and improves the quality of and access to hospital and other health services for rural residents of the State. Consistent with their rural health care plans, states may designate eligible rural hospitals as CAHs.

CAHs must be located in a rural area (or an area treated as rural); be more than 35 miles (or 15 miles in areas with mountainous terrain or only secondary roads available) from another hospital or be certified before January 1, 2006 by the State as being a necessary provider of health care services. CAHs are required to make available 24-hour emergency care services that a State determines are necessary. CAHs may have a maximum of 25 acute care and swing beds, and must maintain an annual average length of stay of 96 hours or less for their acute care patients. CAHs are reimbursed by Medicare on a cost basis (i.e., for the reasonable costs of providing inpatient, outpatient and swing bed services).

The legislative authority for the Flex Program and cost-based reimbursement for CAHs are described in the Social Security Act, Title XVIII, Sections 1814 and 1820, available at [http://www.ssa.gov/OP\\_Home/ssact/title18/1800.htm](http://www.ssa.gov/OP_Home/ssact/title18/1800.htm)



# TABLE OF CONTENTS

I. Executive Summary.....	i
II. Introduction and Purpose of the Project .....	1
III. Background .....	3
IV. Methods.....	6
V. Results .....	9
VI. Discussion .....	12
VII. References .....	16
Appendix: Acronyms Used in this Report.....	26

## Tables

Table 1. Number of CAHs in Analysis by State and Year .....	18
Table 2. CAH Inpatient Hospitalizations by Patient Age Group .....	19
Table 3. Admission Source of CAH Inpatient Hospitalizations.....	20
Table 4. CAH Inpatient Hospitalizations by Expected Primary Payer .....	21
Table 5. Top 20 DRGs for CAH Inpatient Hospitalizations.....	22
Table 6. Transfers of Inpatients from CAHs to Other Hospitals by State .....	23
Table 7. DRGs with Largest Number of Inpatient Transfers of Inpatients from CAHs to Other Hospitals .....	24
Table 8. CAH Inpatient Hospitalizations and Transfers to Other Hospitals for Adult Pneumonia, Heart Failure, and AMI DRGs.....	25



## **EXECUTIVE SUMMARY**

The purpose of this project is to assess the implications of CAH inpatient hospitalizations and transfers from CAHs to other hospitals for national quality measurement and reporting, and to help inform the development of quality indicators for CAHs focused on the transfer process.

### **Methods**

The report examines inpatient hospitalizations in CAHs and transfers from CAHs to other acute care settings, using hospital discharge data from nine states available through AHRQ's Healthcare Cost and Utilization Project (H-CUP).

### **Findings**

The top 20 CAH DRGs accounted for over half of inpatient CAH admissions during 2001-2004. Respiratory and cardiac conditions that are common among the elderly, including pneumonia, heart failure, chest pain, and chronic obstructive pulmonary disease ranked high among CAH DRGs. These results confirm the importance of pneumonia and heart failure as CAH conditions to be assessed by national quality measures. In addition, they indicate that labor/delivery and newborn care remain important CAH diagnoses, and suggest that quality measures focused on those diagnoses would be relevant for CAHs that provide obstetrical care.

Among the top DRGs, the conditions with the largest numbers of inpatients transferred to other acute care hospitals were pneumonia, heart failure, acute myocardial infarction

(AMI) and angina. Compared to community hospitals nationally, CAHs in the current study transferred a higher percentage of their inpatients to other hospitals.

The overall rate of CAH patient transfers and high transfer rates for certain conditions such as AMI have several implications for quality measurement and quality improvement in CAHs. First, exclusion of transferred patients significantly reduces the eligible CAH patient population for some quality measures, and suggests that consideration be given to adapting relevant measures to include transferred patients. Second, the CAH transfer data confirm the importance of developing and implementing additional quality measures for CAHs that specifically address triage, stabilization and transfer of patients, including measures of the timeliness and appropriateness of transfers. Third, CAH transfer rates underscore the importance of implementing protocols and guidelines to improve the pre-transfer quality of care and decisionmaking regarding CAH patients who are transferred.

Finally, in addition to quality measures that appropriately reflect the inpatient conditions cared for by CAHs, a comprehensive system for measuring quality in CAHs also should address development and implementation of quality measures for outpatients, including Emergency Department patients.

## **INTRODUCTION**

A broad set of stakeholders are interested in public reporting of hospital quality measures as a means of encouraging quality improvement, enhancing provider accountability, and informing health care purchasers and consumers. The Hospital Quality Alliance (HQA), a voluntary national initiative to encourage public reporting of hospital quality information, was established in 2002, and the Centers for Medicare and Medicaid Services (CMS) implemented the Hospital Compare website in 2005 to provide consumers with access to the HQA data.

The Medicare Prescription Drug, Improvement and Modernization Act of 2003 required acute care hospitals paid under the Medicare Prospective Payment System (PPS) to report data on HQA quality measures, beginning with 2004 discharges, and to agree to have their data publicly displayed on the Hospital Compare website. PPS hospitals that did not report the required data faced a 0.4% reduction in their annual payment update from Medicare in fiscal year 2006.

Critical Access Hospitals (CAHs) are small, rural hospitals that are either located 35 miles from another hospital (or 15 miles in areas with mountainous terrain or only secondary roads) or state-certified as necessary providers of care. CAHs may have a maximum of 25 acute care and swing beds, and must maintain an annual average length of stay of 96 hours or less for their acute care patients. As of June 2006, a total of 1,286 CAHs were located in 45 states.

Unlike PPS hospitals, CAHs are reimbursed by Medicare on a cost basis, and do not have a financial incentive to submit quality measure data to Hospital Compare. However, the initiative provides an important opportunity for CAHs to assess and improve their performance on national standards of care. Improving the quality of care provided by CAHs is a goal of the Medicare Rural Hospital Flexibility (Flex) Program, and the Institute of Medicine Committee on the Future of Rural Health has recommended that rural providers be included in public reporting initiatives.<sup>1</sup>

The Hospital Compare measures address recommended treatments for acute myocardial infarction (AMI), heart failure, pneumonia, and surgical infection prevention. Patients who are transferred to another hospital or received in transfer from another hospital are not included in the population for several Hospital Compare measures.<sup>2</sup> As of September 2005, 41% of CAHs were voluntarily participating in Hospital Compare, but most reported data on less than 25 patients for all of the AMI measures and two of the four heart failure measures.<sup>3</sup> (When a hospital has less than 25 patients for a measure, the number of cases is considered by CMS to be too small to reliably predict performance at the hospital level.)

Increases are expected both in the number of CAHs participating in Hospital Compare and the number of patients for whom CAHs report quality measure data. However, no national studies have analyzed the extent to which CAHs are caring for patients with conditions addressed by the Hospital Compare measures or examined the implications of CAH transfer patterns for national quality measurement.

## **Purpose of the Project**

The purpose of this project is to assess the implications of CAH inpatient hospitalizations and transfers from CAHs to other hospitals for national quality measurement and reporting, and to help inform the development of quality indicators for CAHs focused on the transfer process. The project addresses the following research questions:

- How many and what type of inpatients are being cared for in CAHs? How often do CAHs treat the conditions being addressed by national quality measures?
- How many and what type of patients are being transferred from CAHs to other hospitals as inpatients? How do transfer exclusions affect the number of CAH patients with conditions being addressed by national quality measures?

## **BACKGROUND**

Prior to the Flex Program, a study of the most frequently treated inpatient diagnoses in very small rural hospitals (average daily census under 10) in three states revealed that the five top ranked DRGs in 1991 were normal newborn, vaginal delivery without complicating diagnoses, adult pneumonia with complications/comorbidities, heart failure, and angina pectoris.<sup>4</sup>

The legislation establishing the Flex Program envisioned that CAHs would help maintain access to inpatient, outpatient, and emergency care in their communities, while transferring patients who require more specialized care to larger hospitals. Since conversion, the majority of CAHs have continued to offer a core set of inpatient and outpatient services. Between 2000 and 2004, expansions of outpatient services, ancillary

services, and swing beds were common, while the number of CAHs providing home health care and obstetrical services declined somewhat.<sup>5</sup>

Several studies have analyzed transfers from rural hospitals of patients with AMI, chest pain, trauma, and those requiring intensive care. A study of Medicare patients in Michigan found that 43% of AMI patients were transferred from a community hospital [defined as a hospital without the capability of performing percutaneous transluminal coronary angioplasty (PTCA), coronary artery bypass graft (CABG) or other open heart surgeries] to a tertiary care facility.<sup>6</sup> Of those who were transferred, 86% were transferred after admission to the community hospital and 14% were transferred directly from the Emergency Department of the community hospital.

In their analysis of care provided to AMI patients in 45 rural and 12 urban hospitals in Kansas, Ellerbeck et al. found that 64% of the rural hospitals transferred more than 80% of their AMI patients, compared to only 22% of the urban hospitals.<sup>7</sup> Similarly, Baldwin et al found that Medicare beneficiaries with AMI treated at rural hospitals were more likely than those from urban hospitals to be transferred to another hospital; 40% of remote rural, 33.5% of small rural, 30.4% of large rural, and 16% of urban hospital admissions for AMI were transferred to another hospital.<sup>8</sup>

Westfall et al studied 1,861 patients with chest pain seen in Emergency Departments (EDs) in 10 rural and frontier hospitals and one clinic with emergency capabilities in northeastern Colorado.<sup>9</sup> Overall, 45% of patients with chest pain were discharged home

from the ED; 8% were transferred directly from the ED to another hospital; 10% were admitted to the rural hospital and then transferred; and 36% were admitted to and cared for exclusively in the rural hospital. Of the subgroup of patients who received AMI diagnoses, 13% were transferred directly from the ED to another hospital and 51% were admitted to the rural hospital and then transferred.

Using a statewide trauma registry, Newgard et al assessed inter-hospital trauma transfer practices and non-clinical factors associated with the transfer of injured patients from the EDs of 42 non-tertiary care hospitals in Oregon from 1998 to 2003.<sup>10</sup> Of a total of 10,176 patients who initially presented to rural hospitals and required admission or transfer, 37% were transferred to a tertiary care hospital from the rural ED.

Wakefield et al proposed three potential rural hospital quality measures related to provision of ICU care: percent of ICU patients transferred to other hospitals, time until transfer, and mortality rates of transferred and non-transferred patients.<sup>11</sup> They examined 2001 hospital discharge data for rural and urban hospitals in Iowa, including 15 CAHs. The CAHs transferred 16.4% of ICU patients and 6.7% of non-ICU patients; these transfer rates were higher than those of other rural hospitals, rural referral hospitals or urban hospitals in Iowa.

Several studies have assessed the impact of patient transfers on receiving hospitals' quality performance measures. Compared to directly admitted patients, surgical and medical patients transferred to academic medical centers from other hospitals have had

significantly longer lengths of stay and higher in-hospital mortality rates, even after controlling for case mix.<sup>12-14</sup> Other studies, however, have found that there were no significant differences in survival or length of stay between ICU patients transferred from other hospitals and ICU patients transferred from within the same tertiary care facility,<sup>15</sup> and that AMI patients who stayed in community hospitals were older and sicker than those who were transferred to tertiary care facilities.<sup>6</sup>

In their assessment of 962 hospitals participating in the National Registry of Myocardial Infarction, Bradley et al found that hospitals with higher transfer rates for AMI had significantly worse performance on a composite process measure based on the CMS/Joint Commission core measures.<sup>16</sup> Excluding transferred AMI patients from calculation of in-hospital mortality rates led to a substantially stronger association between AMI process measures and short-term mortality. These results suggest that, depending on the condition, exclusion of transferred patients can have a significant impact on the performance of smaller rural hospitals that transfer a large percentage of patients as well as on the performance of referral hospitals that receive a large number of transferred patients with the condition.

## **METHODS**

This project uses hospital inpatient discharge data from nine states that have CAHs, make their State Inpatient Databases (SID) available through AHRQ's Healthcare Cost and Utilization Project (H-CUP), and allow access to hospital identifiers that permit identification of hospitals as CAHs.<sup>17</sup> The nine states are Florida, Iowa, Kentucky, New

York, North Carolina, Wisconsin, Colorado, Oregon, and Washington. Four years of data (2001-2004) were used for Florida, Iowa, Kentucky, North Carolina, Oregon, and Washington; three years of data (2001-2003) for Wisconsin and Colorado; and two years (2001-2002) for New York.

The SID data were linked with a CAH database maintained by the Sheps Center at the University of North Carolina, using American Hospital Association identification numbers. The UNC database provided dates of conversion for the CAHs, indicating that many converted to CAH status during 2001-2004. Inpatient discharges were included in the analyses starting with the month of CAH conversion for all states except Florida and Washington. These two states do not provide the month of discharge, only the quarter of discharge, therefore, Florida and Washington discharges were included starting with the quarter of conversion.

The discharge data covered all patients who were admitted to CAHs as inpatients, including those who were then transferred to other short-term acute care hospitals. Patients who were seen in a CAH Emergency Department and then transferred to another hospital without first being admitted to the CAH as inpatients are not included in the SID. The Iowa data do not include records for patients with mental health or AIDS diagnoses, because Iowa does not allow release of those data.

Table 1 shows the total number of CAHs and the number of CAHs in the analyses by state for each year. Between 91% and 97% of CAHs in the selected states were included

in the analyses; CAHs were excluded only if they did not have an American Hospital Association identification number to match to the SID or did not have discharges reported. At the time of the study, data were not available for New York for 2003 or 2004 or for Colorado and Wisconsin for 2004. The nine states in the study represented one-fifth of the 45 states in the Flex Program, and the CAHs with discharge data represented approximately one-fifth of all CAHs nationally in 2001-2004.<sup>i</sup>

### **Study Limitations**

This study has two limitations. First, the nine states for the study were selected based on the availability of uniform discharge data with hospital identifiers necessary to identify CAHs. Although the CAHs in the study were distributed across regions of the country and represented approximately 20% of CAHs during 2001-2004, they may not be representative of all CAHs nationally. Second, the study underestimates the total number of patients who were transferred from CAHs to other hospitals, because the SID do not include patients who are transferred directly from a CAH Emergency Department to another hospital, without being admitted as inpatients at the CAH. Studies suggest that 8 to 14% of patients with AMI and 37% of trauma patients are transferred directly to another hospital from a rural Emergency Department.<sup>6, 9, 10</sup>

---

<sup>i</sup>The CAHs with discharge data in these analyses represented 19.2% of CAHs certified as of December 31, 2001; 20.8% of CAHs certified as of December 31, 2002; 21.3% of CAHs certified as of December 31, 2003; and 16.0% of CAHs certified as of December 31, 2004.

## RESULTS

### Inpatient Hospitalizations

A total of 307,112 inpatient hospitalizations occurred in CAHs in these nine states over the 2001-2004 period (Table 2). New York, with the smallest number of CAHs and only 2 years of available data, had the lowest number of hospitalizations (3,038) over this time period; Iowa had the highest (88,287). Over all states and years, 55.1% of the CAH hospitalizations involved patients aged 65 and older. The percent of patients in this age group was highest in New York (72.0%) and Iowa (64.6%). Nationally, patients aged 65 and older accounted for 35% of inpatient hospitalizations in community hospitals in 2002.<sup>18</sup>

Overall, 54% of CAH inpatient hospitalizations were routine admissions (including births), 41% were admissions from an Emergency Department, and 2.5% were admissions from another hospital (Table 3). Admissions from an emergency department were least common in Iowa (27%) and most common in Florida (66%). The distribution of CAH inpatient hospitalizations by admission source is fairly similar to that of all community hospitals nationally, where 50% of admissions are routine, 43% originate in the Emergency Department and 7% are from another hospital or of unknown origin.<sup>18</sup>

Table 4 shows the distribution of CAH inpatient hospitalizations by primary expected payer at the time of admission. Overall, Medicare was the expected primary payer for 58% of admissions. Florida and Iowa had the highest percentages of Medicare hospitalizations (65%), and Washington and Oregon had the lowest (49% and 46%

respectively), reflecting differences in the age distribution of patients across these states. The percent of hospitalizations with Medicaid as the expected primary payer varied considerably across states, from 7% in Iowa to 30% in Washington.

Table 5 shows the top 20 DRGs in CAHs across all states and years as well as the percent of CAH discharges and 2003 community hospital discharges nationally for each DRG. The top 20 CAH DRGs accounted for over half of CAH inpatient hospitalizations in the nine states. Reflecting the high percentage of CAH patients aged 65 and over, many of the top CAH DRGs were for conditions that are more common among the elderly, including pneumonia, heart failure, and chronic obstructive pulmonary disease (COPD).

Several of the top 20 DRG conditions represented higher percentages of CAH discharges than they did of community hospital discharges nationally. Seven percent of CAH discharges were for pneumonia with complications/comorbidities in adults and 1.4% for pneumonia without complications/comorbidities in adults, compared to 2.3% and 0.4% respectively of community hospital discharges. Similarly, heart failure represented 4.9% of CAH discharges, but only 2.7% of community hospital discharges.

Three obstetrical-related DRGs (normal newborn, vaginal delivery without complications, and caesarean section without complications) were among the top 20 CAH DRGs. Together, they represented 10.7% of CAH discharges, compared to 16.7% of community hospital discharges. The lower percentage of obstetrical-related discharges among CAHs is not surprising, since only 39% of CAHs provide obstetrical services.<sup>5</sup>

## **Transfers to Other Hospitals**

Across all states and years, 7.5% of CAH inpatient hospitalizations resulted in a transfer to a short-term acute care hospital (Table 6). The percentage of inpatient transfers was highest among CAHs in New York (10.2%) and North Carolina (9.0%). The percent of inpatient hospitalizations resulting in a transfer to another hospital is higher in CAHs than all hospitals (2.2%) and rural hospitals (4.7%) nationally in 2003.<sup>19</sup>

Table 7 shows the DRGs with the largest number of inpatient transfers from CAHs to other hospitals and the percent of CAH transfers accounted for by each DRG. The largest numbers of transfers from CAHs were for pneumonia with complications/comorbidities in adults, heart failure, AMI without complications/comorbidities, angina, and AMI with complications/comorbidities. These five DRGs accounted for 22% of all CAH inpatients transferred to another acute care hospital.

For the DRGs with the largest number of inpatient transfers, Table 7 also shows transfers as a percent of discharges for each DRG. The DRGs with the highest percent of transfers were a neonatal DRG that is primarily for infants who were transferred to another facility, followed by AMI without complications/comorbidities (55%), disorders of the biliary tract with complications (31%), angina (29%), AMI with complications/comorbidities (27%), disorders of the biliary tract without complications/comorbidities (27%), atherosclerosis with complications/comorbidities (22%), gastrointestinal obstruction with complications/comorbidities (18%), renal failure (18%), and fractures of the hip and pelvis (17%).

Table 8 summarizes the number of inpatient hospitalizations and transfers to other hospitals for adult pneumonia, heart failure, and AMI, the conditions addressed in the initial CMS/JCAHO core measures. These three conditions account for 15% of CAH inpatient hospitalizations and 19% of CAH inpatient transfers.

## **DISCUSSION**

In this analysis of inpatient discharge data, Medicare was the expected primary payer for 58% of admissions. The high percent of Medicare admissions demonstrates the ongoing importance of CAHs in providing access to care for rural Medicare beneficiaries, as well as the continuing influence of the Medicare program on the financial status of CAHs.

The top 20 CAH DRGs accounted for over half of inpatient CAH admissions during 2001-2004. The most frequently treated DRGs in CAHs during this time period were similar to those of very small rural hospitals in 1991.<sup>4</sup> Conditions that are common among the elderly predominated among CAH DRGs in 2001-2004; obstetrical-related DRGs ranked lower than in the 1991 study, but were still among the top five diagnoses. The top two ranked DRGs in 1991, normal newborn and vaginal delivery without complicating diagnoses, were ranked 2<sup>nd</sup> and 5<sup>th</sup> in the current study. Adult pneumonia with complications/comorbidities and heart failure, which were the 3<sup>rd</sup> and 4<sup>th</sup> ranked DRGs in 1991, were 1<sup>st</sup> and 3<sup>rd</sup> in the current analysis. These results confirm the importance of pneumonia and heart failure as CAH conditions to be assessed by national quality measures. In addition, they indicate that labor/delivery and newborn care remain

important CAH diagnoses, and suggest that quality measures focused on those diagnoses would be relevant for CAHs that provide obstetrical care.

While pneumonia and heart failure are among the most common conditions cared for by CAHs, low patient volume is still a problem for a number of individual quality measures for these conditions, which only apply to a subset of patients with the condition.

Aggregation of measures across conditions has been suggested as a strategy for addressing insufficient patient volume for condition-specific quality measures.<sup>20</sup> The most common CAH inpatient diagnoses include respiratory and cardiac related conditions for which some cross-cutting quality measures might be developed. For example, the current Hospital Compare smoking cessation advice measures for patients with AMI, pneumonia and heart failure who smoke might be aggregated into a single measure that addresses smoking cessation advice for CAH patients with these three conditions as well as other appropriate conditions commonly treated in CAHs such as COPD and stroke.

Compared to community hospitals nationally, CAHs transferred a higher percentage of their inpatients to other hospitals. The overall rate of CAH patient transfers and especially high transfer rates for certain conditions such as AMI have several implications for quality measurement and quality improvement in CAHs. First, exclusion of transferred patients substantially reduces the eligible CAH patient population for some quality measures and has been found to significantly affect AMI quality results in a national study.<sup>16</sup> Therefore, it is important to evaluate the impact of transfer exclusions on CAH

quality measure results, and consideration should be given to adapting relevant measures to include transferred patients.

Second, the CAH transfer data confirm the importance of developing and implementing additional quality measures for CAHs that specifically address triage, stabilization and transfer processes, including measures of the timeliness and appropriateness of transfers. This type of measure has been identified as an important part of a quality measurement system for rural hospitals that has not been addressed in existing national quality measure sets.<sup>20</sup>

Third, CAH transfer rates underscore the importance of implementing protocols and guidelines to improve the pre-transfer quality of care and decisionmaking regarding CAH patients who are transferred. The use of standardized protocols for high risk and high volume transfers between acute care facilities has been identified as a priority patient safety intervention for rural hospitals.<sup>21</sup> Evidence suggests that this is an area where small rural hospitals have considerable potential for improvement. For example, a recent survey found that one-third of the 104 predominantly rural Minnesota hospitals without cardiac catheterization labs did not have hospital-specific guidelines, protocols or standing orders addressing ST-segment elevation myocardial infarction, and only 8% of hospital guidelines addressed criteria for triage and transfer of patients to a tertiary cardiovascular center.<sup>22</sup>

Finally, in addition to quality measures that appropriately reflect the inpatient conditions cared for by CAHs, a comprehensive system for measuring quality in CAHs also should address development and implementation of quality measures for outpatients, including Emergency Department patients. CMS is developing a quality measurement system for Prospective Payment System (PPS) hospital outpatient departments and recently proposed to use the Hospital Compare inpatient AMI, heart failure, pneumonia and surgical infection prevention measures to measure outpatient quality of care for PPS hospitals on an interim basis.<sup>23</sup> Future research should evaluate the appropriateness of PPS hospital outpatient quality measures for CAHs.

## REFERENCES

1. Institute of Medicine, Committee on the Future of Rural Health Care Quality, Board on Health Care Services. *Quality Through Collaboration: The Future of Rural Health Care*. Washington DC: National Academies Press, 2005.
2. Centers for Medicare and Medicaid Services, JCAHO. Specifications Manual for National Hospital Quality Measures, Version 2.1. Available at: [www.qualitynet.org/dcs/ContentServer?cid=1141662756099&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page](http://www.qualitynet.org/dcs/ContentServer?cid=1141662756099&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page). Accessed July 28, 2006.
3. Casey M, Moscovice I. CAH participation in Hospital Compare and Initial Results: Flex Monitoring Team Briefing Paper No. 9. Minneapolis, MN: University of Minnesota Rural Health Research Center; 2006. Available at: [www.flexmonitoring.org](http://www.flexmonitoring.org). Accessed July 28, 2006.
4. Wellever A, Moscovice I, Chen M. A DRG-based service limitation system for rural primary care hospitals. Working Paper #4. Minneapolis, MN: University of Minnesota Rural Health Research Center; December 1993.
5. Hartley D, Loux S. Scope of services offered by Critical Access Hospitals: Results of the 2003 National CAH survey. Portland, ME: Flex Monitoring Team; 2005. Available at: [www.flexmonitoring.org](http://www.flexmonitoring.org). Accessed July 28, 2006.
6. Mehta RH, Stalhandske EJ, McCargar PA, Ruane TJ, Eagle KA. Elderly patients at highest risk with acute myocardial infarction are more frequently transferred from community hospitals to tertiary centers: Reality or myth? *Am Heart J*. 1999;138:688-695.
7. Ellerbeck EF, Bhimaraj A, Perpich D. Organization of care for acute myocardial infarction in rural and urban hospitals in Kansas. *Journal of Rural Health*. 2004;20:363-367.
8. Baldwin LM, MacLehose RF, Hart LG, Beaver SK, Every N, Chan L. Quality of care for acute myocardial infarction in rural and urban US hospitals. *Journal of Rural Health*. 2004;20:99-108.
9. Westfall JM, Van Vorst RF, McGloin J, Selker HP. Triage and diagnosis of chest pain in rural hospitals: Implementation of the ACI-TIPI in the High Plains Research Network. *Annals of Family Medicine*. 2006;4:153-158.
10. Newgard CD, McConnell KJ, Hedges JR. Variability of trauma transfer practices among non-tertiary care hospital emergency departments. *Acad Emerg Med*. 2006;13:746-754.
11. Wakefield DS, Ward M, Miller T, et al. Intensive care unit utilization and interhospital transfers as potential indicators of rural hospital quality. *Journal of Rural Health*. 2004;20:394-400.

12. Gordon HS, Rosenthal GE. Impact of interhospital transfers on outcomes in an academic medical center: Implications for profiling hospital quality. *Med Care*. 1996;34:295-309.
13. Riggs JE, Libell DP, Hobbs GR. In-hospital stroke mortality, hospital transfers, and referral bias at a rural academic medical center. *Journal of Rural Health*. 2002;18:294-297.
14. Rosenberg AL, Hofer TP, Strachan C, Watts CM, Hayward RA. Accepting critically ill transfer patients: Adverse effect on a referral center's outcome and benchmark measures. *Ann Intern Med*. 2003;138:882-890.
15. Surgenor SD, Corwin HL, Clerico T. Survival of patients transferred to tertiary intensive care from rural community hospitals. *Critical Care*. 2001;5:100-104.
16. Bradley EH, Herrin J, Elbel B, et al. Hospital quality for acute myocardial infarction: Correlation among process measures and relationship with short-term mortality. *JAMA*. 2006;296:72-78.
17. HCUP State Inpatient Databases 2001-2004. Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality.
18. Merrill CT, Elixhauser A. *Hospitalization in the United States, 2002*. HCUP Fact Book No.6. AHRQ Publication 05-0056. Rockville, MD: Agency for Healthcare Research and Quality; 2005.
19. HCUPNet. 2003 National Statistics: Outcomes by patient and hospital characteristics for all discharges. Available at: [www.ahrq.gov/HCUPNet.asp](http://www.ahrq.gov/HCUPNet.asp). Accessed July 28, 2006.
20. Moscovice I, Wholey DR, Klingner J, Knott A. Measuring rural hospital quality. *Journal of Rural Health*. 2004;20:383-393.
21. Coburn AF, Wakefield M, Casey M, Moscovice I, Payne S, Loux S. Assuring rural hospital patient safety: What should be the priorities? *Journal of Rural Health*. 2004;20:314-326.
22. Larson DM, Sharkey SW, Unger BT, Henry TD. Implementation of acute myocardial infarction guidelines in community hospitals. *Acad Emerg Med*. 2005;12:522-527.
23. Centers for Medicare and Medicaid Services. Hospital Quality Alliance Hospital Quality Measures 2004-2007. Available at: [www.cms.hhs.gov/HospitalQualityInits/downloads/HospitalHQA2004\\_2007200512.pdf](http://www.cms.hhs.gov/HospitalQualityInits/downloads/HospitalHQA2004_2007200512.pdf). Accessed July 28, 2006.

**Table 1  
Number of CAHs in Analysis by State and Year**

	2001		2002		2003		2004	
State	CAHs as of 12/31/01	CAHs in analysis	CAHs as of 12/31/02	CAHs in analysis	CAHs as of 12/31/03	CAHs in analysis	CAHs as of 12/31/04	CAHs in analysis
Colorado	12	11	17	16	21	20	N/A	N/A
Florida	7	6	8	7	9	8	11	10
Iowa	32	32	44	44	55	55	66	66
Kentucky	12	9	14	11	19	16	23	21
North Carolina	7	6	12	10	13	11	18	16
New York	7	5	7	6	N/A	N/A	N/A	N/A
Oregon	9	8	11	10	16	15	22	22
Washington	10	10	22	22	28	28	35	34
Wisconsin	17	16	25	24	31	30	N/A	N/A
Total for 9 states	113	103	160	150	192	183	175	169

**Table 2**  
**CAH Inpatient Hospitalizations by Patient Age Group**

Age in years at admission	Colorado 2001-2003		Florida 2001-2004		Iowa 2001-2004		Kentucky 2001-2004		New York 2001-2002		North Carolina 2001-2004		Oregon 2001-2004		Washington 2001-2004		Wisconsin 2001-2003		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>0-17</b>	2081	14.4	463	3.3	8347	9.5	2476	6.7	44	1.4	1136	4.7	4959	12.9	8998	18.5	4388	11.3	32892	10.7
<b>18-64</b>	5134	35.5	5577	39.5	22903	25.9	14232	38.3	807	26.6	9223	38.1	15294	39.8	18962	39.1	12918	33.2	105050	34.2
<b>65+</b>	7266	50.2	8092	57.3	57037	64.6	20403	55.0	2187	72.0	13840	57.2	18180	47.3	20575	42.4	21590	55.5	169170	55.1
<b>Total</b>	14481	100.0	14132	100.0	88287	100.0	37111	100.0	3038	100.0	24199	100.0	38433	100.0	48535	100.0	38896	100.0	307112	100.0

**Table 3**  
**Admission Source of CAH Inpatient Hospitalizations**

<b>Admission source</b>	<b>Colorado 2001-2003</b>	<b>Florida 2001-2004</b>	<b>Iowa 2001-2004</b>	<b>Kentucky 2001-2004</b>	<b>New York 2001-2002</b>	<b>North Carolina 2001-2004</b>	<b>Oregon 2001-2004</b>	<b>Washington 2001-2004</b>	<b>Wisconsin 2001-2003</b>	<b>All States</b>
<b>Routine, birth, and other</b>	45.8%	34.0%	63.0%	46.5%	32.1%	47.0%	52.3%	64.0%	47.9%	54.2%
<b>Emergency department</b>	44.9%	65.8%	26.6%	51.8%	57.3%	52.0%	47.1%	33.6%	51.4%	41.4%
<b>Other health facility (including long term care), another hospital or missing</b>	9.2%	0.2%	10.3%	1.7%	10.5%	1.1%	0.6%	2.3%	0.7%	4.3%

**Table 4**  
**CAH Inpatient Hospitalizations by Expected Primary Payer**

<b>Expected primary payer<sup>1</sup></b>	<b>Colorado 2001-2003</b>	<b>Florida 2001-2004</b>	<b>Iowa 2001-2004</b>	<b>Kentucky 2001-2004</b>	<b>New York 2001-2002</b>	<b>North Carolina 2001-2004</b>	<b>Oregon 2001-2004</b>	<b>Washington 2001-2004</b>	<b>Wisconsin 2001-2003</b>	<b>All States</b>
<b>Medicare</b>	50.1%	65.4%	65.3%	61.0%	76.1%	64.0%	48.5%	45.6%	57.4%	57.8%
<b>Medicaid</b>	14.4%	13.8%	6.8%	15.8%	5.1%	13.1%	15.7%	29.9%	8.0%	14.0%
<b>Private insurance</b>	26.0%	10.5%	22.8%	13.0%	14.1%	15.1%	26.5%	20.3%	29.2%	21.4%
<b>Self-pay/no charge</b>	7.6%	9.08%	4.3%	2.9%	3.4%	5.5%	4.0%	2.8%	3.9%	4.3%
<b>Other</b>	1.9%	1.5%	0.8%	7.3%	1.4%	2.3%	5.2%	1.4%	1.4%	2.5%

<sup>1</sup>The expected primary payer is based on insurance status at admission. The payer at discharge may differ in some cases, for example, if a patient who was not previously enrolled in Medicaid is determined to be eligible and enrolled during the hospitalization.

**Table 5**  
**Top 20 DRGs for CAH Inpatient Hospitalizations**  
**(All Nine States and Years Combined)**

<b>DRG in effect on discharge date</b>	<b>N</b>	<b>% of CAH discharges</b>	<b>% of discharges from community hospitals nationally in 2003<sup>1</sup></b>
89: SIMPLE PNEUMONIA & PLEURISY AGE >17 W CC	21,563	7.0%	2.3%
391: NORMAL NEWBORN	16,624	5.4%	8.1%
127: HEART FAILURE & SHOCK	15,183	4.9%	2.7%
88: CHRONIC OBSTRUCTIVE PULMONARY DISEASE	13,632	4.4%	1.8%
373: VAGINAL DELIVERY W/O COMPLICATING DIAGNOSES	12,334	4.0%	6.3%
182: ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE >17 W CC	9,223	3.0%	1.5%
143: CHEST PAIN	7,130	2.3%	1.9%
462: REHABILITATION	7,121	2.3%	1.2%
296: NUTRITIONAL & MISC METABOLIC DISORDERS AGE >17 W CC	6,522	2.1%	1.0%
320: KIDNEY & URINARY TRACT INFECTIONS AGE >17 W CC	5,826	1.9%	0.9%
174: G.I. HEMORRHAGE W CC	5,692	1.9%	1.1%
183: ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE >17 W/O CC	4,895	1.6%	1.5%
138: CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS W CC	4,483	1.5%	0.8%
90: SIMPLE PNEUMONIA & PLEURISY AGE >17 W/O CC	4,273	1.4%	0.4%
371: CESAREAN SECTION W/O CC	3,941	1.3%	2.3%
14: INTRACRANIAL HEMORRHAGE OR CEREBRAL INFARCTION	3,774	1.2%	1.0%
79: RESPIRATORY INFECTIONS & INFLAMMATIONS AGE >17 W CC	3,730	1.2%	0.7%
294: DIABETES AGE >35	3,576	1.2%	0.6%
416: SEPTICEMIA AGE >17	3,527	1.1%	0.9%
277: CELLULITIS AGE >17 W CC	3,350	1.1%	0.6%
<b>TOTAL Top 20 CAH DRGs</b>	<b>156,399</b>	<b>50.9%</b>	<b>37.6%</b>

<sup>1</sup>H-CUP Net, Statistics for US Community Hospital Stays, Most Common Diagnoses for the top 100 DRGs, 2003

**Table 6**  
**Transfers of Inpatients from CAHs to Other Hospitals**  
**By State**  
**(All Nine States and Years Combined)**

<b>State</b>	<b>Transfers to Other Hospitals</b>	
	<b>N</b>	<b>% of CAH discharges</b>
Colorado (2001-2003)	1099	7.6%
Florida (2001-2004)	1218	8.6%
Iowa (2001-2004)	6343	7.2%
Kentucky (2001-2004)	2910	7.8%
New York (2001-2002)	311	10.2%
North Carolina (2001-2004)	2182	9.0%
Oregon (2001-2004)	2871	7.5%
Washington (2001-2004)	3142	6.5%
Wisconsin (2001-2003)	2974	7.6%
All States	23,050	7.5%

**Table 7**  
**DRGs with the Largest Number of Inpatient Transfers from CAHs to Other Hospitals**  
**(All Nine States and Years Combined)**

<b>DRG in effect on discharge date</b>	<b>Number of transfers</b>	<b>Transfers as % of discharges for DRG</b>	<b>Percent of transfers</b>
89: SIMPLE PNEUMONIA & PLEURISY AGE >17 W CC	1349	6.3%	5.9%
127: HEART FAILURE & SHOCK	1133	7.5%	4.9%
122: CIRCULATORY DISORDERS W AMI W/O MAJOR COMP, DISCHARGED ALIVE	969	54.8%	4.2%
140: ANGINA PECTORIS	897	28.7%	3.9%
121: CIRCULATORY DISORDERS W AMI & MAJOR COMP, DISCHARGED ALIVE	718	27.4%	3.1%
174: G.I. HEMORRHAGE W CC	690	12.1%	3.0%
385: NEONATES, DIED OR TRANSFERRED TO ANOTHER ACUTE CARE FACILITY	683	95.0%	3.0%
182: ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE >17 W CC	663	7.2%	2.9%
138: CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS W CC	597	13.3%	2.6%
143: CHEST PAIN	595	8.3%	2.6%
88: CHRONIC OBSTRUCTIVE PULMONARY DISEASE	568	4.2%	2.5%
180: G.I. OBSTRUCTION W CC	496	18.3%	2.2%
132: ATHEROSCLEROSIS W CC	475	22.0%	2.1%
462: REHABILITATION	449	6.3%	2.0%
416: SEPTICEMIA AGE >17	385	10.9%	1.7%
296: NUTRITIONAL & MISC METABOLIC DISORDERS AGE >17 W CC	368	5.6%	1.6%
207: DISORDERS OF THE BILIARY TRACT W CC	366	31.2%	1.6%
204: DISORDERS OF PANCREAS EXCEPT MALIGNANCY	356	12.1%	1.5%
316: RENAL FAILURE	344	17.8%	1.5%
14: INTRACRANIAL HEMORRHAGE OR CEREBRAL INFARCTION	322	8.5%	1.4%
139: CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS W/O CC	313	10.2%	1.4%
236: FRACTURES OF HIP & PELVIS	292	17.1%	1.3%
183: ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE >17 W/O CC	271	5.5%	1.2%
320: KIDNEY & URINARY TRACT INFECTIONS AGE >17 W CC	263	4.5%	1.1%
243: MEDICAL BACK PROBLEMS	259	7.9%	1.1%
15: NONSPECIFIC CVA & PRECEREBRAL OCCLUSION W/O INFARCT	242	7.2%	1.1%

**Table 8**  
**CAH Inpatient Hospitalizations and Transfers to Other Hospitals**  
**for Adult Pneumonia, Heart Failure, and AMI DRGs**  
**(All Nine States and Years Combined)**

<b>DRG in effect on discharge date</b>	<b>N</b>	<b>%of CAH discharges</b>	<b>Transfers</b>	<b>%of CAH transfers</b>
SIMPLE PNEUMONIA & PLEURISY AGE >17 W CC	21,563		1,349	
SIMPLE PNEUMONIA & PLEURISY AGE >17 W/O CC	4,273		176	
<b>TOTAL SIMPLE PNEUMONIA &amp; PLEURISY AGE &gt;17</b>	<b>25,836</b>	<b>8.4%</b>	<b>1,525</b>	<b>6.6%</b>
<b>HEART FAILURE &amp; SHOCK</b>	<b>15,183</b>	<b>4.9%</b>	<b>1,133</b>	<b>4.9%</b>
CIRCULATORY DISORDERS W AMI & MAJOR COMP, DISCHARGED ALIVE	2,618		718	
CIRCULATORY DISORDERS W AMI W/O MAJOR COMP, DISCHARGED ALIVE	1,767		969	
CIRCULATORY DISORDERS W AMI, EXPIRED	481		-	
<b>TOTAL CIRCULATORY DISORDERS W AMI</b>	<b>4,866</b>	<b>1.6%</b>	<b>1,687</b>	<b>7.3%</b>
<b>TOTAL FOR ALL THREE CONDITIONS</b>	<b>45,885</b>	<b>14.9%</b>	<b>4,345</b>	<b>18.8%</b>

## **APPENDIX: Acronyms Used in This Report**

**AHRQ: Agency for Healthcare Research and Quality.**

**AMI: acute myocardial infarction** (heart attack)

### **CAH: Critical Access Hospital**

A CAH is a facility that is designated as a CAH by the State in which it is located and meets the following criteria:

- Is a rural public, non-profit or for-profit hospital; or hospital that was closed within the previous ten years; or health clinic that was downsized from a hospital;
  - Is located in a State that has established a State plan with CMS for the Medicare Rural Hospital Flexibility Program;
  - Is located more than a 35-mile drive from any other hospital or CAH (in mountainous terrain or in areas with only secondary roads available, the mileage criterion is 15 miles); or is certified before January 1, 2006 by the State as being a necessary provider of health care services to residents in the area;
  - Makes available 24-hour emergency care services 7 days per week;
  - Provides not more than 25 acute care inpatient beds for providing inpatient care;
- and
- Provides an annual average length of stay of less than 96 hours per patient for acute care patients.

**COPD: Chronic Obstructive Pulmonary Disease**

**CMS: Centers for Medicare and Medicaid Services**

**DRG: Diagnosis Related Group**

**ED: Emergency Department**

### **Flex Program: Medicare Rural Hospital Flexibility Program**

The Medicare Rural Hospital Flexibility Program (Flex Program) was authorized by section 4201 of the Balanced Budget Act of 1997 (BBA), Public Law 105-33. The Flex Program provides funding to States for the designation of critical access hospitals (CAHs) in rural communities and the development of networks to improve access to care in these communities. Under the program, hospitals certified as CAHs can receive cost-based reimbursement from Medicare.

**ICU: Intensive Care Unit**

**JCAHO: Joint Commission on Accreditation of Healthcare Organizations**

**ORHP: federal Office of Rural Health Policy**

The Office of Rural Health Policy (ORHP) promotes better health care service in rural America. Established in August 1987 by the Administration, the Office was subsequently authorized by Congress in December 1987 and located in the Health Resources and Services Administration. Congress charged the Office with informing and advising the Department of Health and Human Services on matters affecting rural hospitals, and health care, co-coordinating activities within the department that relate to rural health care, and maintaining a national information clearinghouse. Additional information is available at <http://www.ruralhealth.hrsa.gov/>

**SID: State Inpatient Databases**