Flex Monitoring Team Briefing Paper No. 20

Critical Access Hospital Year 3 Hospital Compare Participation and Quality Measure Results

August 2008

With funding from the federal Office of Rural Health Policy (PHS Grant No. U27RH01080), the Rural Health Research Centers at the Universities of Minnesota, North Carolina, and Southern Maine are 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 CAHs; and engaging rural communities in health care system development.

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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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Introduction

This report examines the third year participation and quality measure results for Critical Access Hospitals (CAHs) in the Centers for Medicare and Medicaid Services (CMS) Hospital Compare public reporting database for hospital quality measures.

Methods

This study used data on hospital participation and quality measure results for January to December 2006 from the Hospital Compare website as of September 2007. Due to the reporting schedule, data for a full calendar year is available from CMS at the end of the following September. These data were linked with data on all CAHs maintained by the Flex Monitoring Team, and data on hospital characteristics from the Fiscal Year 2006 American Hospital Association (AHA) Annual Survey and other secondary data sources. Participation was defined as reporting data on one or more quality measures for one or more inpatient discharges during 2006. Participation rates for CAHs were calculated by accreditation status, size, date of CAH conversion and ownership type.

The 2006 quality measure results for participating CAHs were compared by 1) accreditation status and ownership and 2) with those of rural and urban PPS hospitals Then, for CAHs and PPS hospitals that reported data for 2004, 2005, and 2006 discharges, results were compared over the three-year time period for each group of hospitals. For each measure, the percent of patients in CAHs and in rural and urban Prospective Payment System (PPS) hospitals that received the recommended care was calculated by dividing the total number of patients in all hospitals in the group who received the recommended care by the total number of eligible patients in the group. Finally, to assess variation within CAHs, we calculated the percent of patients receiving recommended care individually for each CAH that had 25 or more patients in the denominator for each measure, and then calculated the mean, median, standard deviation and range of scores for this group of CAHs.

As with our previous analyses of Hospital Compare data, several caveats are necessary in evaluating these results. Although the percent of CAHs participating in Hospital Compare has increased, participating and non-participating CAHs still differ significantly on several organizational characteristics. Thus, the quality measure results for CAHs that voluntarily participate in Hospital Compare may not be representative of all CAHs. Some of the differences in scores between groups of hospitals are only a few percentage points, but are statistically significant because of the large sample sizes involved. However, these differences may not be of practical significance because the scores are high for all groups.

Results

For 2006 discharges, 63% of CAHs participated in Hospital Compare by submitting data for at least one patient on one measure. (This total does not include 289 CAHs that submitted quality measure data for 2006 discharges to Q-Net Exchange, the national Quality Improvement Organization data warehouse, but did not allow the data to be

publicly reported to Hospital Compare). CAH participation rates vary by state and by CAH organizational characteristics. By state, the percent of participating CAHs ranged from 7.7% to 100%. Seven states had 100% of their CAHs participating. CAHs were more likely to report data on pneumonia and heart failure measures than on AMI and surgical infection prevention measures.

Similar to the first and second year results, for 2006 discharges, CAHs did not do as well on the AMI and heart failure measures as rural and urban PPS hospitals. For pneumonia and surgical infection prevention, CAHs scored as well or better than other hospitals on some measures, and not as well on other measures.

Among CAHs that reported Hospital Compare data for 2004, 2005 and 2006, the percent of CAH patients receiving recommended care increased for nearly all measures. The percent of rural and urban PPS hospital patients receiving recommended care also increased. Thus, CAHs continued to have lower scores relative to rural and urban PPS hospitals on several measures.

At the individual hospital level, substantial variation in quality results within the group of CAHs reporting at least 25 patients for a measure is further evidence of the potential for lower performing CAHs to improve the quality of care they provide.

Discussion and Conclusions

Over the past three years, the percent of CAHs participating in Hospital Compare has continued to increase, indicating that many CAHs see the value of taking part in a national effort to collect and publicly report on quality of care measures. However, participation rates continue to vary widely across states.

CAHs that have participated in Hospital Compare for three years have significantly improved their performance on nearly all measures, but continue to have lower scores relative to rural and urban PPS hospitals on many measures. While some differences between CAHs and PPS hospitals may not be of practical significance, other differences are larger and indicate that CAHs still have room for improvement, especially with regard to recommended care for AMI and heart failure patients.

In comparing the results for CAHs with rural and urban PPS hospitals, it is important to recognize that hospital characteristics such as patient volume, the size and composition of medical and nursing staff, financial resources, and the availability of technology may influence the measurement of quality as well as the provision of care in the hospital environment. For measures that are rural relevant, comparisons of results across groups of hospitals can be a useful means of exploring the extent to which differences may be occurring due to factors related to patient volume or other aspects of the rural or urban environment.

At the same time, it is also very important to remember that the aggregate scores for groups of CAHs, and PPS rural and urban hospitals include a wide range of scores for individual hospitals. Some individual hospitals in each group are performing much better than the average, and others are performing worse. While small numbers continue to

complicate evaluation of quality performance at the individual CAH level, identification of individual high performing CAHs is useful so that their successful strategies and best practices can be replicated in other hospitals that need to improve the quality of care they provide.

CMS is continuing to add inpatient measures to the quality reporting program for PPS hospitals and Hospital Compare. Some of the new and proposed measures address conditions that are commonly treated in CAHs (e.g., nursing sensitive measures, AMI Emergency Department/outpatient measures) while others address procedures not usually performed in CAHs (e.g., cardiac surgery).

Low volume remains a problem for calculating a number of measures, especially AMI measures, at the individual hospital level, and also limits the usefulness of some new measures that have been added to Hospital Compare, such as 30-day mortality rates for AMI and heart failure. Additional research is needed to evaluate alternative methods of assessing and comparing quality performance at the hospital level for small rural hospitals. Identification of high performing CAHs would allow their successful strategies and best practices to be replicated in other hospitals that need to improve the quality of care they provide.

INTRODUCTION

The Medicare Prescription Drug, Improvement and Modernization Act of 2003 established an incentive payment for eligible acute care hospitals paid under the Medicare Prospective Payment System (PPS) to report data on ten quality measures reflecting recommended care for acute myocardial infarction (AMI), heart failure and pneumonia, beginning with their 2004 discharges. The hospitals were also required to agree to have their data publicly displayed on the Centers for Medicare and Medicaid Services' (CMS) Hospital Compare website.

In 2005-2006, 11 more measures were added to the measure set for the Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU) program, which included additional measures for AMI, heart failure and pneumonia, and two measures related to surgical infection prevention. Beginning with third quarter 2006 discharges, PPS hospitals were required to collect and submit data on the expanded set of 21 clinical quality measures. 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 and a 2.0% percent reduction in fiscal years 2007 and 2008. For care delivered during 2006, 93% of eligible PPS hospitals participated and met requirements; six percent failed to meet requirements; and one percent chose not to participate (CMS, 2007).

Critical Access Hospitals (CAHs) were authorized as part of the Medicare Rural Hospital Flexibility Program passed in 1997. 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 December 2007, there were a total of 1,292 CAHs nationally. Unlike PPS hospitals, CAHs are reimbursed by Medicare on a cost basis, and do not have a financial incentive to submit quality measure data for the HQA initiative. CAHs can choose to submit data for any or all of the measures in the measure set. Although CAHs do not face the same financial incentives as PPS hospitals to participate, the Hospital Compare 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 an important goal of the Medicare Rural Hospital Flexibility Program.

PURPOSE OF THIS PROJECT

The purpose of this project is to:

- Determine the percent of CAHs that are participating in the third year of Hospital Compare, identify key characteristics related to CAH participation, and examine reporting of measures by condition;
- Compare the quality measure results for all participating CAHs with rural and urban PPS hospitals; and
- Analyze quality measure trends over time for CAHs and other groups of hospitals with data for 2004, 2005, and 2006.

METHODS

This project used secondary data on hospital participation and quality measure results for January through December 2006 from the CMS Hospital Compare website (http://www.hospitalcompare.hhs.gov/). The Hospital Compare measures are based on data abstracted from patient records for hospital discharges. Due to the reporting schedule, data for a full calendar year are available from CMS at the end of the following September. In September 2007, the most current data from the website for hospital discharges in 2006 were downloaded and converted to a database with one record for each participating hospital using SAS Version 9.1 statistical analysis software (SAS Institute Inc., Cary, NC). These data were linked with data on all CAHs maintained by the Sheps Center at the University of North Carolina as part of its Flex Monitoring Team activities, and data on hospital characteristics from the Fiscal Year 2006 American Hospital Association (AHA) Annual Survey.

The Hospital Compare data were linked to the other data sources using Medicare provider numbers, AHA identification numbers, hospital names and addresses, and county FIPs codes. For non-participating CAHs and hospitals that were not in the AHA database or had missing or conflicting data, data on accreditation were obtained from the JCAHO Quality Check website and the American Osteopathic Association website, and FIPS county codes were obtained from a SAS ZIP code/FIPS code matching database. Of the 4,416 hospitals in the Hospital Compare database, 55 hospitals in Puerto Rico, Guam, the Virgin Islands and Mariana Islands were removed from this analysis, leaving 4,361 hospitals. A total of 125 hospitals, including 26 CAHs, were in the Hospital Compare database, but had zeros or missing data in the denominators for all measures and therefore were not counted as participating.

Hospital Compare data for hospital discharges in 2004 and 2005 had been downloaded in September 2005 and September 2006 for previous analyses (Casey and Moscovice, 2006; Casey, Burlew and Moscovice, 2007) and were also available for this analysis. Hospitals in the three databases were linked, using current and previous Medicare provider numbers (CAHs receive new Medicare provider numbers after converting), hospital name and ZIP code. PPS hospitals were classified as rural or urban based on their location in an Office of Management and Budget designated non-metropolitan (rural) or metropolitan (urban) county. Participation rates for CAHs were calculated by accreditation status, size, date of CAH conversion and ownership type. Chi-square tests and t-tests were used to test for significant differences between participants and non-participants.

The quality measure results for participating CAHs were compared with those of rural and urban PPS hospitals. Although the number of CAH patients for whom measures were reported had again increased since the previous year's analysis, many CAHs still had a very small number of patients for several measures. Therefore, aggregate scores could end were calculated across all reporting hospitals in each subgroup. For each measure, the percent of patients in CAHs and in the other hospital groups that received

the recommended care were calculated by dividing the total number of patients in all hospitals in the group who received the recommended care by the total number of eligible patients for each measure.[1] This method gives more weight to hospitals with more patients. Statistical tests (z-tests) were conducted to determine whether the differences in the proportions of patients in each group of hospitals that received the recommended care were statistically significant.

An alternative method of comparing the performance of CAHs and other hospitals is to calculate mean scores for each hospital individually, and then calculate an average for each subgroup. An advantage of this method is that each hospital contributes equally to the subgroups' means. However, this "average of averages" method can give a less accurate picture of the performance of a group of hospitals when a large number of the facilities have very small numbers of patients for the measures, as is currently the case with CAHs.

RESULTS

CAH Participation in Hospital Compare

Table 1 shows the number of CAHs in each state as of December 2006 and the percent of CAHs that were participating in Hospital Compare for 2006 discharges. Overall, a total of 812 CAHs (63.1%) were participating in Hospital Compare, defined as submitting data for at least one patient for one measure. This total does not include 289 CAHs that submitted quality measure data for 2006 discharges to Q-Net Exchange, the national Quality Improvement Organization data warehouse, but did not allow the data to be publicly reported to Hospital Compare (based on unpublished data from the Oklahoma QIO, 2008).

By state, the percent of CAHs participating in Hospital Compare varies considerably, ranging from 7.7% to 100%. Of the 45 states with CAHs, three states had less than 25% participation; nine states had between 25 and 50% participation; 15 states had between 51 and 75% participation and 18 states had more than 75% participation, including seven states with 100% of their CAHs participating.

The overall CAH participation rate of 63% for 2006 discharges compares to 41% for 2004 discharges and 53% for 2005 discharges (Figure 1). Figure 2 shows the percent of CAHs that participated in Hospital Compare for 2006 discharges by date of CAH certification. From 2001 through 2005, between 141 and 225 CAHs were certified each year; in 2006, only 19 CAHs were certified. CAHs certified in 1999 or earlier had the lowest Hospital Compare participation rate (47%), while those certified in 2005 had the highest rate (85%). Of the 19 hospitals certified as CAHs in 2006, 12 (63%) participated in Hospital Compare for 2006 discharges.

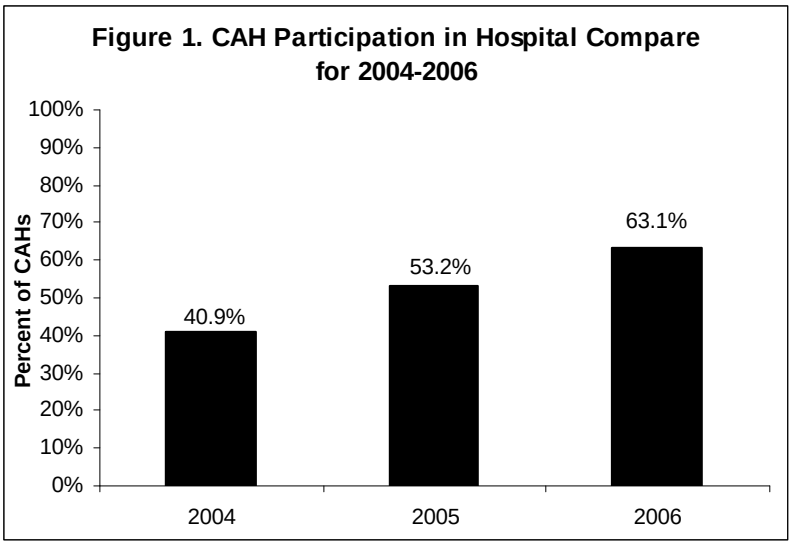
[1]For example, if one hospital had 10 out of 20 patients and another hospital had 70 out of 100 patients receiving recommended care for a given measure, the aggregate score across the hospitals would be 67% (80 out of 120 patients). Using the alternative "average of averages" method, the score would be 60%, the average of 50% (10/20) and 70% (70/100).

Table 1
Critical Access Hospital (CAH) Participation in Hospital Compare by State for 2006 Discharges

State[1]	Number of CAHs[2]	Percent of CAHs Participating in Hospital Compare[3]	State	Number of CAHs	Percent of CAHs Participating in Hospital Compare
Alabama	4	100.0	Nebraska	65	92.3
Alaska	11	18.2	Nevada	11	18.2
Arizona	14	78.6	New Hampshire	13	100.0
Arkansas	28	67.9	New Mexico	6	100.0
California	25	88.0	New York	13	38.5
Colorado	25	44.0	North Carolina	20	85.0
Florida	11	63.6	North Dakota	31	41.9
Georgia	35	60.0	Ohio	34	76.5
Hawaii	9	22.2	Oklahoma	33	90.9
Idaho	26	7.7	Oregon	25	68.0
Illinois	51	76.5	Pennsylvania	12	66.7
Indiana	35	71.4	South Carolina	5	80.0
Iowa	82	69.5	South Dakota	38	39.5
Kansas	84	53.6	Tennessee	16	62.5
Kentucky	30	80.0	Texas	74	28.4
Louisiana	27	29.6	Utah	9	66.7
Maine	15	100.0	Vermont	8	100.0
Massachusetts	4	75.0	Virginia	7	100.0
Michigan	34	41.2	Washington	39	51.3
Minnesota	80	65.0	West Virginia	18	100.0
Mississippi	27	37.0	Wisconsin	58	84.5
Missouri	35	80.0	Wyoming	14	92.9
Montana	45	51.1	All States	1,286	63.1

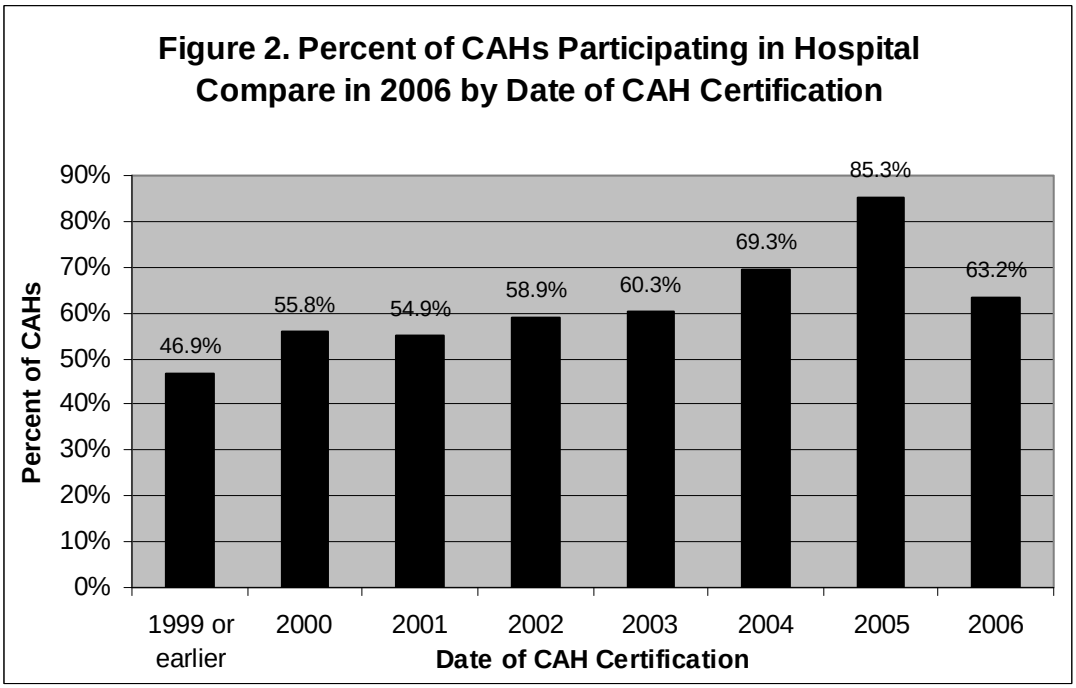
[1]Five states (Connecticut, Delaware, Maryland, New Jersey and Rhode Island) do not have any CAHs.
[2]Number of CAHs certified as of December 2006.
[3]Participation was defined as providing data on at least one patient for one measure.

Data sources: Hospital Compare data for 2006 discharges, downloaded from CMS website September 2007 and Flex is a Monitoring Team CAH database, December 2007.



Participation was defined as providing data on at least one patient for one measure.

Data sources: Hospital Compare data for 2004, 2005 and 2006 discharges, downloaded from CMS website September 2005, September 2006, and September 2007; Flex Monitoring Team CAH database, December 2007.



Data sources: Hospital Compare data for 2006 discharges, downloaded from CMS website September 2007 and Flex Monitoring Team CAH database, December 2007.

All CAHs are limited to a maximum of 25 beds; on average, CAHs that participated in Hospital Compare had significantly more beds (23.3) than non-participants (21.1) ($p<.001$). CAHs that were accredited by the Joint Commission or the American

Osteopathic Association were significantly more likely (77%) than non-accredited CAHs (58%) to participate in Hospital Compare ($p<.001$) (Table 2). Seventy percent of private non-profit CAHs participated in Hospital Compare, compared to 56% of those with government/public ownership and 49% of for-profit CAHs. The higher rate of Hospital Compare participation among accredited CAHs, which has been a trend since 2004, is not surprising, since the Joint Commission has required accredited hospitals to report performance measurement data since 2002, and initiated public reporting of core measure data in 2004. The percent of CAHs participating in Hospital Compare in 2006 ranged from 47% of those certified in 1999 or earlier to 85% of those certified in 2005.

Hospitals that converted to CAH status in 2005 accounted for the largest group of participants. Those that converted in 2006 and in 1999 or earlier were the smallest groups. While accredited CAHs are more likely to participate in Hospital Compare, the large number of non-accredited CAHs means that almost two-thirds of the CAHs that participated in Hospital Compare were not accredited. Private non-profit CAHs accounted for 57% of CAH participants; those with public ownership 40% of participants; and for-profit CAHs three percent of participants.

Table 2
CAH Hospital Compare Participation by Accreditation, Ownership and Year of Conversion
(N = 1,286)

	Total number of CAHs	Percent of CAHs that participate in Hospital Compare
Accreditation		
Accredited	375	76.8%
Not accredited	911	57.5%
Ownership		
Government/public	577	56.3%
Private non-profit	658	70.2%
For profit	51	49.0%
Year of Conversion		
1999 or earlier	113	46.9%
2000	190	55.8%
2001	224	54.9%
2002	175	58.9%
2003	141	60.3%
2004	199	69.3%
2005	225	85.3%
2006	19	63.2%

Data sources: Hospital Compare data for 2006 discharges downloaded from CMS website September, 2007; Flex Monitoring Team CAH database, December 2007; FY 2006 AHA Annual Survey; Joint Commission Quality Check website 2007; American Osteopathic Association Health Facilities Accreditation Program website 2007; American Hospital Directory website 2007.

CAH Reporting of Measures by Condition

Figure 3 describes the 22 process of care measures in the Hospital Compare measure set for 2006 discharges. The 22 measures include 21 measures required for submission for 2006 discharges by PPS hospitals and one additional measure, prophylactic antibiotic selection for surgical patients. This measure was revised and required for submission beginning with discharges in the first quarter of 2007.

This report presents data for CAHs on 21 measures. Data for the AMI percutaneous coronary intervention (PCI) measure were not included because the total number of CAH patients nationally was less than 25. PCI procedures require specialized equipment and cardiology expertise not usually present in CAHs.

Figure 3. Hospital Compare Measures for 2006 Discharges

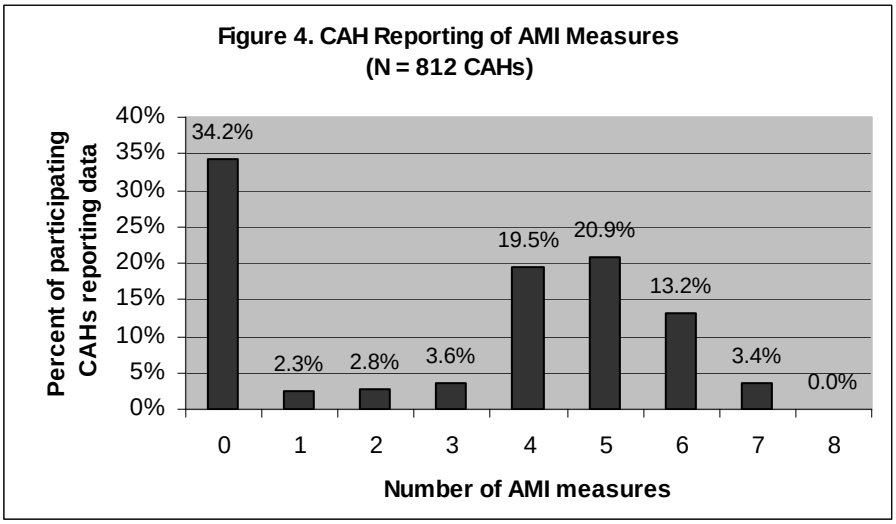
Heart attack/acute myocardial infarction (AMI) Measures
Aspirin at arrival – AMI patients without aspirin contraindications who received aspirin within 24 hours before or after hospital arrival.
Aspirin at discharge – AMI patients without aspirin contraindications who were prescribed aspirin at hospital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

Figure 3. Hospital Compare Measures for 2006 Discharges

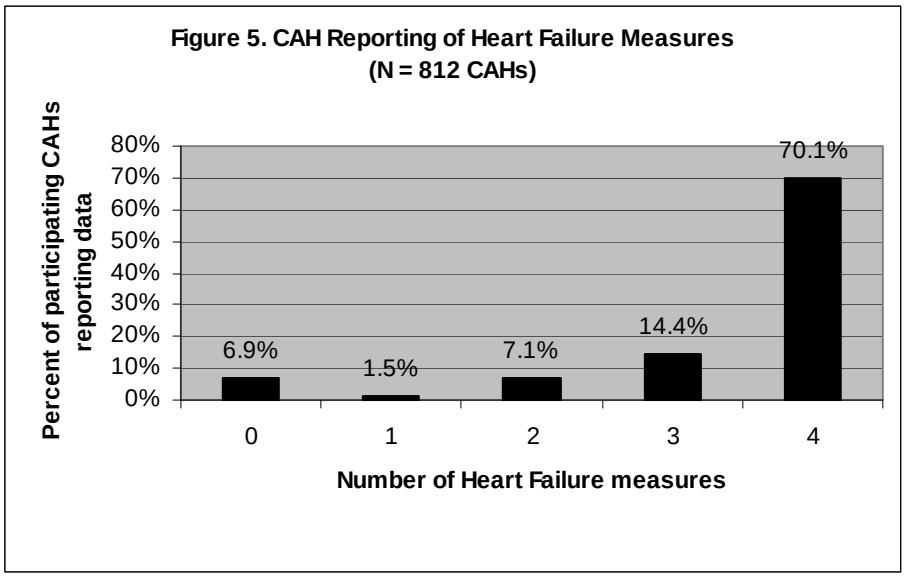
Pneumonia Measures
Oxygenation assessment – Pneumonia inpatients who receive an oxygenation assessment, arterial blood gas, or pulse oximetry within 24 hours of hospital arrival.
Initial antibiotic timing – Pneumonia inpatients who received initial antibiotics within 4 hours after arrival at the hospital. (This measure has subsequently been revised to 6 hours).
Blood culture performed prior to first antibiotic received in hospital – Pneumonia patients whose initial hospital blood culture specimen was collected prior to first hospital dose of antibiotics.
Smoking cessation advice/counseling – AMI patients with a history of smoking cigarettes who are given smoking cessation advice or counseling during a hospital stay.
Appropriate initial antibiotic selection – Immunocompetent patients with pneumonia who receive an initial antibiotic regimen that is consistent with current guidelines.
Influenza vaccination status – Pneumonia patients age 50 years and older, hospitalized in October through February who were screened for influenza vaccine status and vaccinated prior to discharge, if indicated.
Surgical Infection Prevention/Surgical Care Improvement Project Measures
Prophylactic antibiotic received within 1 hour prior to surgical incision – Surgical patients who received prophylactic antibiotics within 1 hour prior to surgical incision.
Prophylactic antibiotic selection – Surgical patients who received the recommended antibiotics for their particular type of surgery.
Prophylactic antibiotics discontinued within 24 hours after surgery end time – Surgical patients whose prophylactic antibiotics were discontinued within 24 hours after surgery end time.

Source: CMS, 2006.

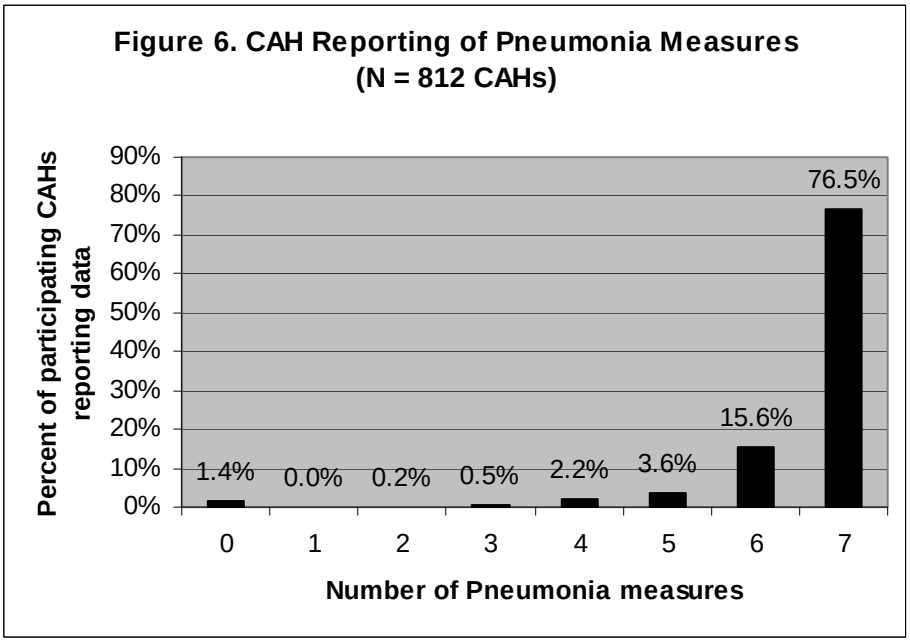
CAHs were more likely to report data on the pneumonia and heart failure measures than on the AMI and surgical infection prevention measures. (Reporting data was defined as having a denominator of one or more patients.) Over one-third (34%) of the 812 CAHs that participated in Hospital Compare did not report data on any of the AMI measures, while 57% reported data on four or more measures (Figure 4). No CAHs reported data on all eight AMI measures.



In contrast, 70% of the 812 participating CAHs reported data on all four heart failure measures, while only 7% did not report data on any heart failure measures (Figure 5).

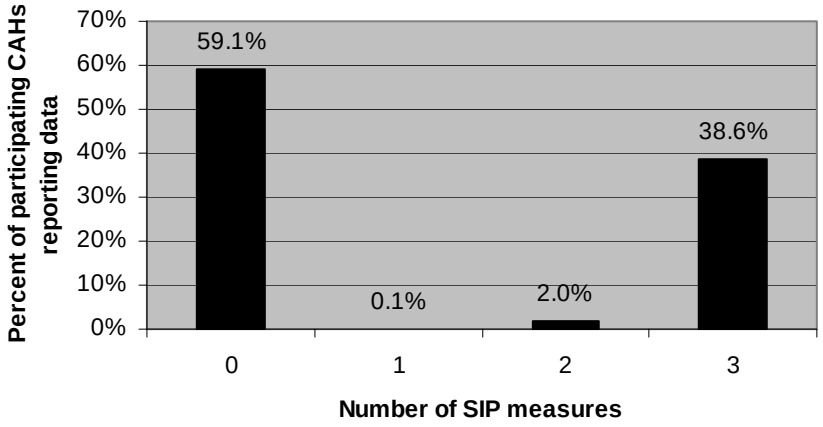


Similarly, 77% of participating CAHs reported data on all seven pneumonia measures and an additional 16% reported data on six measures; only 1.4% did not report data on any pneumonia measures (Figure 6).



For the surgical infection prevention measures, 59% of participating CAHs did not report data on any measures, while 39% of reported data on all three measures (Figure 7).

Figure 7. CAH Reporting of Surgical Infection Prevention Measures (N = 812 CAHs)



For each measure, Table 3 shows the number of CAHs that reported data for one or more patients and for 25 or more patients.[2] The number of CAHs reporting data and the number of patients for whom data are submitted varies widely across measures. Very few CAHs reported data for 25 or more patients on any of the AMI measures, two heart failure measures (ACE inhibitor/ARB for LVSD, smoking cessation advice), and two pneumonia measures (smoking cessation advice, influenza vaccination). Excluding the PCI measure, the total number of CAH patients nationally per measure ranges from 214 for the AMI fibrinolytic measure to 37,769 for the pneumonia oxygenation assessment measure.

The number of CAHs reporting and the number of patients for whom data are available may differ by measure for several reasons. Hospitals have had a longer time to become familiar with and report on the initial ten measures, which were the measures initially required for PPS hospitals. Some measures only apply to a portion of patients (e.g., the smoking cessation advice measures only apply to smokers), and several measures exclude patients with contraindications for receiving that type of medication. The AMI measures only apply to patients who are admitted to the hospital as inpatients; small rural hospitals transfer many AMI patients seen in their emergency departments to larger hospitals, rather than admitting them as inpatients (Mehta, Stalhandske, McCargar et al, 1999; Baldwin, MacLehose, Hart et al, 2004; Ellerbeck, Bhimaraj, and Perpich, 2004; Westfall, Van Vorst, McGloin, et al, 2006). Consequently, CAHs may have few eligible patients for the AMI measures. Approximately two-thirds of CAHs

[2] 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. As the number of cases used to determine hospitals' rates increases, the reliability and stability of the rates increase.

provide some type of inpatient surgery services (Casey and Klingner, 2004). The surgical infection prevention measures apply to selected surgeries; some (e.g., hysterectomies) are more commonly provided in CAHs than others (e.g., cardiac procedures).

Table 3
CAHs Reporting and CAH Patients by Measure for 2006 Discharges
(N = 812 CAHs)

Condition	Measure	Number of CAHs reporting data for ≥1 patient	Number of CAHs reporting data for ≥25 patients	Total number of CAH patients with data
AMI	Aspirin at arrival	509	6	2,873
	Aspirin at discharge	478	1	2,060
	ACEI or ARB for LVSD	240	0	485
	Smoking cessation advice	155	0	262
	Beta blocker at discharge	478	1	2,173
	Beta blocker at arrival	497	6	2,687
	Fibrinolytic w/in 30 minutes of arrival	114	0	214
	PCI w/in 120 minutes of arrival	**	**	**
Heart Failure	Discharge instructions	737	244	15,327
	Assessment of LVS	753	388	22,310
	ACE inhibitor or ARB for LVSD	657	23	5,126
	Smoking cessation advice	608	3	2,896
Pneumonia	Oxygenation assessment	801	579	37,769
	Pneumococcal vaccination	798	457	25,944
	Blood culture prior to first antibiotic	748	280	17,345
	Smoking cessation advice	747	42	7,566
	Initial antibiotic(s) within 4 hours	791	496	29,771
	Most appropriate initial antibiotic(s)	793	426	23,747
	Influenza vaccination	664	20	6,252
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	331	168	12,501
	Received most appropriate preventative antibiotic(s)	314	101	6,339
	Preventative antibiotic(s) stopped within 24 hours after surgery	330	165	12,025

** The total number of CAH patients nationally with data on this measure was less than 25.

Comparison of Quality Results

The next section of the report compares the quality measure results for CAHs 1) by accreditation status and type of ownership and 2) with rural and urban PPS hospitals. Then, for CAHs and PPS hospitals that reported data for 2004, 2005, and 2006 discharges, results are compared over the three-year time period for each group of hospitals. The comparisons are based on the 21 measures for which CAHs reported data; as noted above, the number of CAHs reporting data for each measure varies.

As with our previous analyses of Hospital Compare data, several caveats are necessary in evaluating these results. Although the percent of CAHs participating in Hospital Compare has increased, participating and non-participating CAHs still differ significantly on several organizational characteristics (e.g., average number of beds, accreditation status, type of ownership, and year of CAH certification). Thus, the quality measure results for CAHs that voluntarily participate in Hospital Compare may not be representative of all CAHs.

In comparing the results for CAHs with rural and urban PPS hospitals, it is important to recognize that hospital characteristics such as patient volume, the size and composition of medical and nursing staff, financial resources, and the availability of technology may influence the measurement of quality as well as the provision of care in the hospital environment. For measures that are rural relevant, comparisons of results across groups of hospitals can be a useful means of exploring the extent to which differences may be occurring due to factors related to patient volume or other aspects of the rural or urban environment.

Some differences between groups of hospitals are statistically significant because of the large sample sizes involved, but are only a few percentage points. These differences may not be of practical significance, especially if the percentages are high for all groups. Finally, it is also very important to remember that the aggregate scores for groups of CAHs, and PPS rural and urban hospitals include a wide range of scores for individual hospitals. Some individual hospitals in each group are performing much better than the average, and others are performing worse.

CAHs by Accreditation Status and Ownership

Table 4 compares the quality measure results for accredited and non-accredited CAHs. Differences between the two groups were not statistically significant for nine measures. Of the remaining measures, nine were significantly higher for accredited CAHs (including one AMI, four heart failure, and four pneumonia measures) while three (including one surgical infection prevention and two pneumonia measures) were higher for non-accredited CAHs.

Table 4

Percent of Patients Receiving Recommended Care in Accredited and Non-Accredited CAHs in 2006

		Percent of Patients Receiving Recommended Care		Significance of differences between accredited and non-accredited CAHs
Condition	**Measure**	**Accredited CAHs (n=288)**	**Non-Accredited CAHs (n=524)**	
AMI	Aspirin at arrival	88.9	88.6	NS
	Aspirin at discharge	86.4	85.7	NS
	ACEI or ARB for LVSD	79.7	78.2	NS
	Smoking cessation advice	77.6	48.5	.001
	Beta blocker at discharge	87.5	86.1	NS
	Beta blocker at arrival	82.2	84.0	NS
	Fibrinolytic w/in 30 minutes of arrival	31.7	39.6	NS
	PCI w/in 120 minutes of arrival	**	**	N/A
Heart Failure	Discharge instructions	65.7	50.6	.001
	Assessment of LVS	75.7	67.4	.001
	ACE inhibitor or ARB for LVSD	82.2	77.8	.001
	Smoking cessation advice	78.6	65.2	.001
Pneumonia	Oxygenation assessment	99.4	99.3	NS
	Pneumococcal vaccination	75.4	70.6	.001
	Blood culture prior to first antibiotic	90.8	92.3	.001
	Smoking cessation advice	81.5	66.5	.001
	Initial antibiotic(s) within 4 hours	84.6	85.8	.01
	Most appropriate initial antibiotic(s)	83.6	82.0	.001
	Influenza vaccination	74.2	69.4	.001
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	79.0	80.0	NS
	Received most appropriate preventative antibiotic(s)	90.8	91.9	NS
	Preventative antibiotic(s) stopped within 24 hours after surgery	72.2	83.2	.001

**The total number of CAH patients nationally with data on this measure was less than 25.
NS = not significant

Table 5 compares the quality measure results for CAHs by type of ownership. The number of participating for-profit CAHs is small. Consequently, this group of CAHs had a page up a total of less than 25 patients for four AMI measures and these data are not reported.

Differences in the quality measure results for private non-profit CAHs and public/government owned CAHs were not statistically significant for five measures. The results for the remaining 16 measures were significantly higher for private non-profit CAHs.

Differences between public/government owned CAHs and for-profit CAHs were not statistically significant for 12 measures. The results for three measures were significantly higher for public/government owned CAHs and for three measures for for-profit CAHs.

Differences between private non-profit CAHs and for-profit CAHs were not statistically significant for seven measures. The results for ten measures were significantly higher for private non-profit CAHs and for one measure for for-profit CAHs.

Table 5
Percent of Patients Receiving Recommended Care in CAHs in 2006 by Ownership Type

		Percent of Patients Receiving Recommended Care			Significance of differences		
Condition	**Measure**	**Public/ Gov't CAHs (n=325)**	**Private non-profit CAHs (n=462)**	**For-profit CAHs (n =25)**	**Public and private non-profit**	**Public and for-profit**	**Private non-profit and for-profit**
AMI	Aspirin at arrival	86.3	89.8	91.2	.01	NS	NS
	Aspirin at discharge	85.7	86.1	87.9	NS	NS	NS
	ACEI or ARB for LVSD	80.1	78.4	**	NS	N/A	N/A
	Smoking cessation advice	65.6	67.1	**	NS	N/A	N/A
	Beta blocker at discharge	82.5	89.3	78.1	.001	NS	.05
	Beta blocker at arrival	78.5	85.9	74.5	.001	NS	.05
	Fibrinolytic w/in 30 minutes of arrival	33.3	39.0	**	NS	N/A	N/A
	PCI w/in 120 minutes of arrival	**	**	**	N/A	N/A	N/A
Heart Failure	Discharge instructions	52.8	61.9	49.4	.001	NS	.001
	Assessment of LVS	67.5	74.4	57.6	.001	.001	.001
	ACE inhibitor or ARB for LVSD	77.3	81.5	83.2	.001	NS	NS
	Smoking cessation advice	66.5	75.6	76.3	.001	.05	NS
Pneumonia	Oxygenation assessment	99.2	99.4	99.3	.01	NS	NS
	Pneumococcal vaccination	68.1	75.7	65.3	.001	NS	.001
	Blood culture prior to first antibiotic	90.4	92.1	88.8	.001	NS	.05
	Smoking cessation advice	67.6	77.4	77.5	.001	.001	NS
	Initial antibiotic(s) within 4 hours	84.1	85.9	84.4	.001	NS	NS
	Most appropriate initial antibiotic(s)	81.4	83.6	80.6	.001	NS	.05
	Influenza vaccination	66.9	74.6	66.8	.001	NS	.01

Table 5

Percent of Patients Receiving Recommended Care in CAHs in 2006 by Ownership Type

		Percent of Patients Receiving Recommended Care			Significance of differences		
Condition	**Measure**	**Public/ Gov't CAHs (n=325)**	**Private non-profit CAHs (n=462)**	**For-profit CAHs (n =25)**	**Public and private non-profit**	**Public and for-profit**	**Private non-profit and for-profit**
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	76.5	80.6	64.1	.001	.001	.001
	Received most appropriate preventative antibiotic(s)	92.5	91.2	78.9	NS	.01	.01
	Preventative antibiotic(s) stopped within 24 hours after surgery	75.5	78.1	84.3	.01	.01	.05

**The total number of CAH patients nationally with data on this measure was less than 25. NS = not significant

CAHs and PPS Hospitals

When CAH patients were compared to rural PPS patients nationally, the percent of CAH patients receiving recommended care in 2006 was significantly higher on two measures, not significantly different on five measures and significantly lower on 14 measures (Table 6).

Table 6

Percent of Patients Receiving Recommended Care in CAHs and Rural PPS Hospitals in 2006

		Percent of Patients Receiving Recommended Care		Significance of differences between CAHs and Rural PPS hospitals
Condition	**Measure**	**CAHs (n=812)**	**Rural PPS Hospitals (n=1,004)**	
AMI	Aspirin at arrival	88.8	94.2	.001
	Aspirin at discharge	86.0	93.3	.001
	ACEI or ARB for LVSD	79.0	85.6	.001
	Smoking cessation advice	66.8	95.0	.001
	Beta blocker at discharge	86.8	93.5	.001
	Beta blocker at arrival	83.1	90.1	.001
	Fibrinolytic w/in 30 minutes of arrival	37.4	42.0	NS
	PCI w/in 120 minutes of arrival	**	56.0	N/A
Heart Failure	Discharge instructions	58.4	67.4	.001
	Assessment of LVS	71.4	85.9	.001
	ACE inhibitor or ARB for LVSD	80.1	82.5	.001
	Smoking cessation advice	72.3	88.1	.001

Table 6

Percent of Patients Receiving Recommended Care in CAHs and Rural PPS Hospitals in 2006

		Percent of Patients Receiving Recommended Care		Significance of differences between CAHs and Rural PPS hospitals
Condition	**Measure**	**CAHs (n=812)**	**Rural PPS Hospitals (n=1,004)**	
Pneumonia	Oxygenation assessment	99.3	99.3	NS
	Pneumococcal vaccination	72.8	75.8	.001
	Blood culture prior to first antibiotic	91.4	91.1	NS
	Smoking cessation advice	74.0	86.5	.001
	Initial antibiotic(s) within 4 hours	85.2	82.7	.001
	Most appropriate initial antibiotic(s)	82.7	83.1	NS
	Influenza vaccination	71.6	73.1	.001
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	79.5	81.3	.001
	Received most appropriate preventative antibiotic(s)	91.3	90.8	NS
	Preventative antibiotic(s) stopped within 24 hours after surgery	77.6	74.8	.001

** The total number of CAH patients nationally with data on this measure was less than 25.

The percent of CAH patients receiving recommended care was significantly lower than rural PPS patients on most of the AMI measures and all four heart failure measures. The pneumonia and surgical infection prevention results were mixed. For pneumonia, CAHs scored significantly higher than rural PPS hospitals on the initial antibiotic within 4 hours measure, not significantly different on the oxygenation assessment, blood culture before first antibiotic and most appropriate antibiotic measures, and significantly lower on the smoking cessation, pneumococcal and influenza vaccination measures. CAHs scored significantly higher than rural PPS hospitals on one surgical infection prevention measure, significantly lower on another and not significantly different on the third.

Compared to urban PPS patients nationally, the percent of CAH patients receiving recommended care in 2006 was significantly higher on three pneumonia measures and one surgical infection measure, not significantly different on one AMI measure and significantly lower on the remaining 16 measures (Table 7).

Some of the differences between CAHs and rural PPS hospitals, and between CAHs and urban PPS hospitals were statistically significant because of the large sample sizes involved, but the differences are not large enough to be of practical significance (e.g., the pneumonia measures, except for smoking cessation advice, and two surgical infection prevention measures). The largest differences were on the AMI and heart failure measures.

Table 7

Percent of Patients Receiving Recommended Care in CAHs and Urban PPS Hospitals in 2006

		Percent of Patients Receiving Recommended Care		Significance of differences between CAHs and Urban PPS hospitals
Condition	**Measure**	**CAHs (n=812)**	**Urban PPS Hospitals (n=2,431)**	
AMI	Aspirin at arrival	88.8	96.9	.001
	Aspirin at discharge	86.0	97.0	.001
	ACEI or ARB for LVSD	79.0	86.7	.001
	Smoking cessation advice	66.8	96.7	.001
	Beta blocker at discharge	86.8	96.5	.001
	Beta blocker at arrival	83.1	94.0	.001
	Fibrinolytic w/in 30 minutes of arrival	37.4	43.3	NS
	PCI w/in 120 minutes of arrival	**	60.4	N/A
Heart Failure	Discharge instructions	58.4	69.7	.001
	Assessment of LVS	71.4	94.2	.001
	ACE inhibitor or ARB for LVSD	80.1	85.8	.001
	Smoking cessation advice	72.3	92.2	.001
Pneumonia	Oxygenation assessment	99.3	99.7	.001
	Pneumococcal vaccination	72.8	74.7	.001
	Blood culture prior to first antibiotic	91.4	90.0	.001
	Smoking cessation advice	74.0	89.3	.001
	Initial antibiotic(s) within 4 hours	85.2	78.3	.001
	Most appropriate initial antibiotic(s)	82.7	86.6	.001
	Influenza vaccination	71.6	70.2	.001
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	79.5	85.4	.001
	Received most appropriate preventative antibiotic(s)	91.3	92.1	.001
	Preventative antibiotic(s) stopped within 24 hours after surgery	77.6	76.4	.001

** The total number of CAH patients nationally with data on this measure was less than 25.

2004, 2005, and 2006 Discharges

A total of 559 CAHs, 981 rural PPS hospitals and 2,304 urban PPS hospitals had Hospital Compare data for 2004, 2005 and 2006 discharges. Hospitals were classified based on their status in 2006. The CAH data include 115 CAHs that reported as PPS acute care hospitals for 2004 discharges and 7 CAHs that reported as PPS acute care hospitals for 2005 discharges, but were CAHs in 2006. Table 8 presents results for 2004, 2005, 2006 discharges for CAH, rural PPS and urban PPS patients for all hospitals that reported data for all three years. (Data on the pneumonia influenza

vaccination measure and the surgical infection prevention most appropriate preventative antibiotic measure were only available for 2006).

On all measures except one (aspirin on arrival for AMI), these CAHs improved their performance from 2004 to 2006. At the same time, however, rural and urban PPS hospitals also improved their performance. Thus, CAHs continued to have a lower percent of patients receiving recommended care relative to rural and urban PPS hospitals for several measures.

Table 8
Percent of Patients Receiving Recommended Care in CAHs and PPS Hospitals with Data for 2004, 2005, and 2006[1,2]

		CAHs in 2006 (n=559)			Rural PPS Hospitals in 2006 (n=981)			Urban PPS Hospitals in 2006 (n=2,304)		
Condition	**Measure**	**2004**	**2005**	**2006**	**2004**	**2005**	**2006**	**2004**	**2005**	**2006**
AMI	Aspirin at arrival	89.3	88.0	88.4	91.8	92.6	94.3	94.9	95.8	96.9
	Aspirin at discharge	84.2	86.1	86.6	89.4	91.9	93.4	94.8	95.9	97.0
	ACEI or ARB for LVSD	72.7	76.9	78.1	76.0	81.2	85.6	79.7	83.8	86.7
	Smoking cessation advice	50.5	64.9	70.2	81.6	89.4	95.0	86.3	92.4	96.7
	Beta blocker at discharge	81.2	85.8	87.8	87.5	91.0	93.5	92.7	95.1	96.5
	Beta blocker at arrival	80.9	80.9	83.0	84.6	87.6	90.1	90.3	92.7	94.0
	Fibrinolytic w/in 30 minutes of arrival	26.8	32.6	37.6	40.7	39.3	42.0	38.3	38.3	43.3
	PCI w/in 120 minutes of arrival	N/A	N/A	N/A	62.8	66.1	56.0	65.0	69.1	60.3
Heart Failure	Discharge instructions	45.1	52.3	61.3	50.0	57.2	67.4	51.6	58.7	69.7
	Assessment of LVS	65.0	69.5	73.9	76.8	81.5	86.1	88.8	92.0	94.2
	ACE inhibitor or ARB for LVSD	72.9	79.2	80.5	72.6	80.7	82.5	76.1	83.1	85.8
	Smoking cessation advice	57.0	65.1	74.7	69.3	80.8	88.4	72.7	84.0	92.2
Pneumonia	Oxygenation assessment	98.4	99.2	99.5	97.4	98.8	99.4	98.9	99.5	99.7
	Pneumococcal vaccination	54.3	65.6	75.3	52.3	65.4	76.0	45.5	60.7	74.7
	Blood culture prior to first antibiotic	82.6	82.8	91.6	83.0	83.8	91.1	82.1	83.1	90.0
	Smoking cessation advice	59.3	65.1	76.7	67.1	77.5	86.6	68.4	80.0	89.4
	Initial antibiotic(s) within 4 hours	82.0	84.3	85.5	75.8	79.6	82.8	69.2	73.9	78.3
	Most appropriate initial antibiotic(s)	74.2	78.0	83.1	73.3	78.0	83.3	76.5	81.1	86.6
	Influenza vaccination	N/A	N/A	73.4	N/A	N/A	73.3	N/A	N/A	70.3
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	63.7	72.8	80.2	73.8	78.1	81.3	76.3	82.2	85.4
	Received most appropriate preventative antibiotic(s)	N/A	N/A	91.1	N/A	N/A	90.8	N/A	N/A	92.0
	Preventative antibiotic(s) stopped within 24 hours after surgery	59.1	73.1	77.7	63.0	68.7	74.8	62.7	68.9	76.3

[1]Hospitals are classified based on their status in 2006. The CAH data includes 115 CAHs that reported as PPS acute care hospitals for 2004 discharges and 7 CAHs that reported as PPS acute care hospitals for 2005 discharges.
[2]The percent of patients receiving recommended care differs slightly from previously reported annual figures (Casey and Moscovice, 2006; Casey, Burlew and Moscovice, 2007) and earlier tables in this report, because they included all hospitals that reported data in that year, while this table only includes hospitals reporting data for all three years.

Table 9 presents the statistically significant differences between the percent of CAH patients and the percent of rural PPS and urban PPS patients receiving recommended care among hospitals with data in 2004, 2005, and 2006.

Table 9

Summary of Statistically Significant Differences in Percent of Patients Receiving Recommended Care in CAHs, Rural PPS and Urban PPS Hospitals with Data for 2004, 2005, and 2006 (N = 3,844)

Condition	Measure	Significant Differences: CAHs compared to rural PPS	Significant Differences: CAHs compared to urban PPS
AMI	Aspirin at arrival	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Aspirin at discharge	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	ACEI or ARB for LVSD	Not significantly different in 2004; lower in 2005, 2006	Lower in 2004, 2005, 2006
	Smoking cessation advice	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Beta blocker at discharge	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Beta blocker at arrival	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Fibrinolytic w/in 30 minutes of arrival	Lower in 2004; Not significantly different in 2005, 2006	Lower in 2004; Not significantly different in 2005, 2006
Heart Failure	Discharge instructions	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Assessment of LVS	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	ACE inhibitor or ARB for LVSD	Not significantly different in 2004; lower in 2005, 2006	Lower in 2004, 2005, 2006
	Smoking cessation advice	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
Pneumonia	Oxygenation assessment	Higher in 2004, 2005; Not significantly different in 2006	Lower in 2004, 2005, 2006
	Pneumococcal vaccination	Higher in 2004; Not significantly different in 2005; lower in 2006	Higher in 2004, 2005; Not significantly different in 2006
	Blood culture prior to first antibiotic	Not significantly different in 2004; lower in 2005; higher in 2006	Not significantly different in 2004, 2005; Higher in 2006
	Smoking cessation advice	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Initial antibiotic(s) within 4 hours	Higher in 2004, 2005, 2006	Higher in 2004, 2005, 2006
	Most appropriate initial antibiotic(s)	Not significantly different in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Influenza vaccination	Not significantly different in 2006	Higher in 2006
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	Lower in 2004, 2005, 2006	Lower in 2004, 2005, 2006
	Received most appropriate preventative antibiotic(s)	Not significantly different in 2006	Lower in 2006

Table 9

Summary of Statistically Significant Differences in Percent of Patients Receiving Recommended Care in CAHs, Rural PPS and Urban PPS Hospitals with Data for 2004, 2005, and 2006 (N = 3,844)

Condition	Measure	Significant Differences: CAHs compared to rural PPS	Significant Differences: CAHs compared to urban PPS
	Preventative antibiotic(s) stopped within 24 hours after surgery	Lower in 2004; higher in 2005, 2006	Lower in 2004; higher in 2005, 2006

In summary, among hospitals with data for all three years, CAHs did not perform as well as rural or urban PPS hospitals for both AMI and heart failure. The results for the pneumonia and surgical infection prevention measures were mixed, with CAHs performing as well or better than PPS hospitals on some measures, and not as well on other measures. By condition, the results were as follows:

AMI

- Compared to rural PPS patients, the percent of CAH patients receiving recommended care in 2004, 2005 and 2006 was significantly lower for six AMI measures and not significantly different for one AMI measure.

- Compared to urban PPS patients, the percent of CAH patients receiving recommended care was significantly lower for seven AMI measures in 2004; for 2005 and 2006 it was significantly lower for six AMI measures and not significantly different for one AMI measure.

Heart Failure

- Compared to rural PPS patients, the percent of patients in CAHs receiving recommended care in 2004 was not significantly different for one heart failure measure and significantly lower for three heart failure measures. In 2005 and 2006, it was significantly lower for all four heart failure measures.

- Compared to urban PPS patients, the percent of patients in CAHs receiving recommended care in 2004, 2005 and 2006 was significantly lower for all four heart failure measures.

Pneumonia

- Compared to rural PPS patients, the percent of pneumonia patients in CAHs receiving recommended care in 2004 was significantly higher for three measures; not significantly different for two measures and significantly lower for one measure. In 2005, it was significantly higher for two measures; not significantly different for two measures; and significantly lower for two measures. In 2006, it was significantly higher for two measures; not significantly different for three measures; and significantly lower for two measures.

- Compared to urban PPS patients, the percent of pneumonia patients in CAHs receiving recommended care in 2004 and 2005 was significantly higher for two measures; not significantly different for one measure and significantly lower for three measures. In 2006, it was significantly higher for three measures; not significantly different for one measure and significantly lower for three measures.

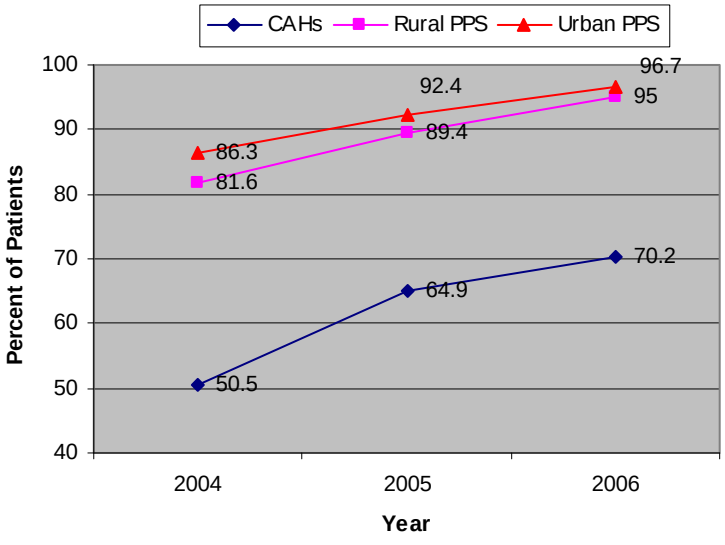
Surgical Infection Prevention

- Compared to rural PPS patients, the percent of surgical patients in CAHs receiving recommended care in 2004 was significantly lower for two measures. In 2005, it was significantly higher for one measure and significantly lower for one measure. In 2006, it was significantly higher for one measure; not significantly different for one measure; and significantly lower for one measure.

- Compared to urban PPS patients, the percent of surgical patients in CAHs receiving recommended care in 2004 was lower for two measures. In 2005, it was significantly higher for one measure and significantly lower for one measure. In 2006, it was significantly higher for one measure and significantly lower for two measures.

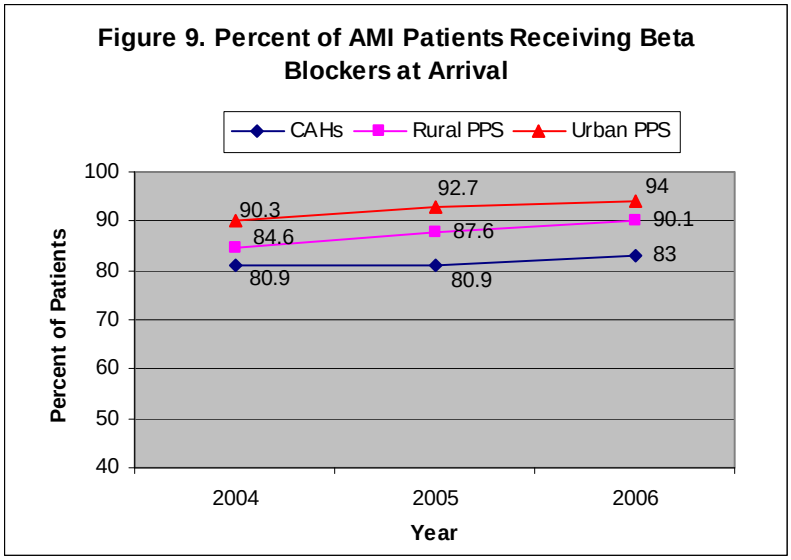
Figures 8 -15 illustrate the 2004-2006 trends for CAHs, rural PPS and urban PPS hospitals for several measures. Among CAHs with data for all three years, the percent of AMI patients who were smokers that received smoking cessation advice increased from 50.5% in 2004 to 70.2% in 2006 (Figure 8). In the same time period, the percent of rural PPS patients receiving smoking cessation advice increased from 81.6% to 95% and the percent of urban PPS patients receiving smoking cessation advice increased from 86.3% to 96.7%.

Figure 8. Percent of AMI Patients Receiving Smoking Cessation Advice



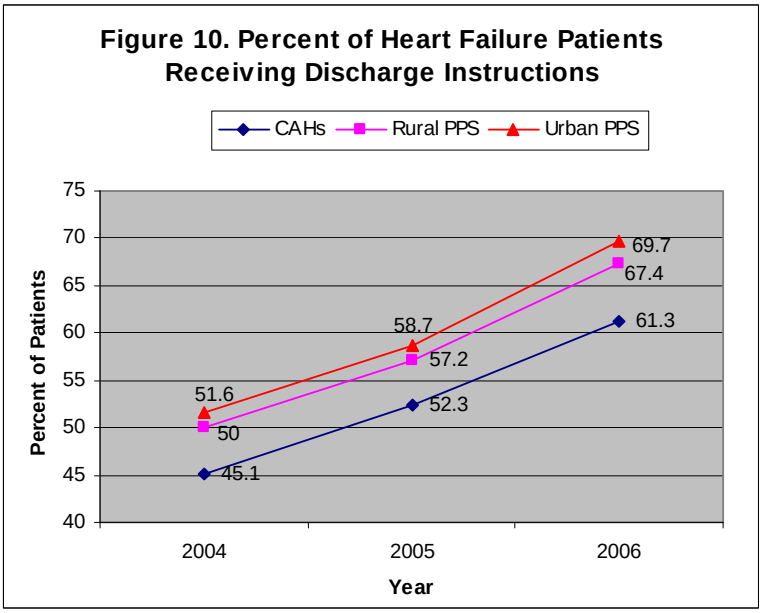
Calculations based on CAHs and PPS Hospitals with three years of data.

The percent of CAH AMI patients who received beta blockers at arrival in the hospital increased from 80.9% in 2004 to 83% in 2006 (Figure 9). In the same time period, the percent of rural PPS AMI patients receiving beta blockers increased from 84.6% to 90.1% and the percent of urban PPS AMI patients receiving beta blockers increased from 90.3% to 94%.



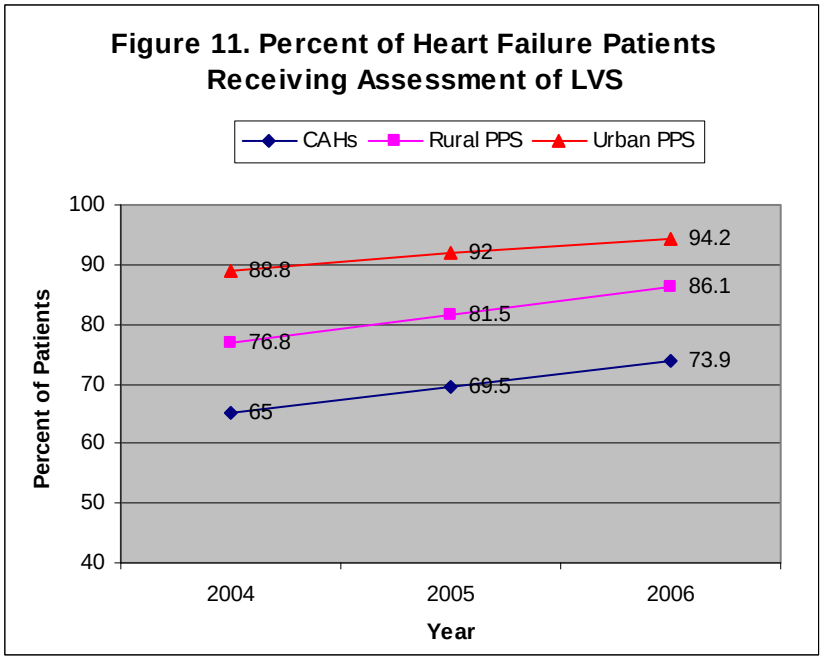
Calculations based on CAHs and PPS Hospitals with three years of data.

Similarly, among CAHs with data for all three years, the percent of heart failure patients that received recommended discharge instructions increased from 45.1% in 2004 to 61.3% in 2006, while the percent of rural PPS and urban PPS patients receiving the recommended discharge instructions increased from 50% to 67.4% and from 51.6% to 69.7% respectively (Figure 10).



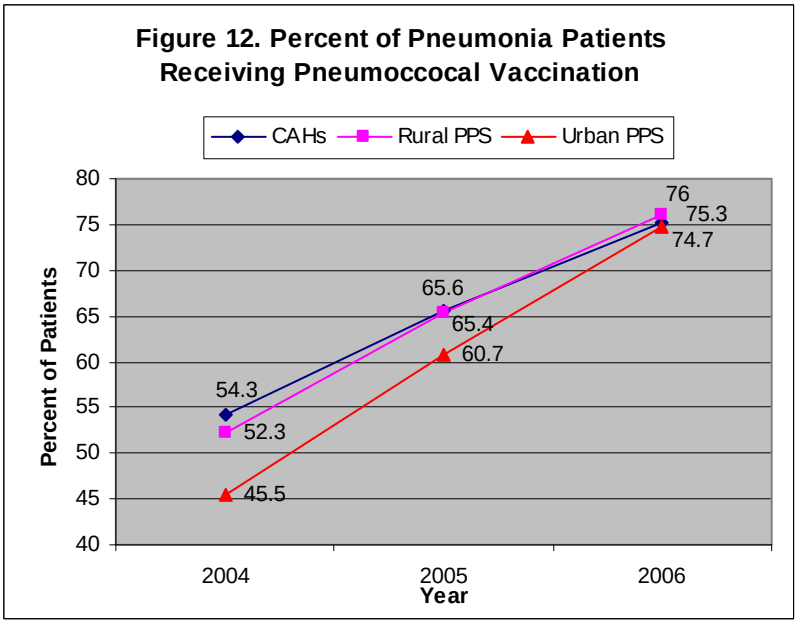
Calculations based on CAHs and PPS Hospitals with three years of data.

During the same time period, the percent of CAH heart failure patients with an LVS assessment increased from 65% in 2004 to 73.9% in 2006, while the percent of rural PPS and urban PPS patients receiving an LVS assessment increased from 76.8% to 86.1% and from 88.8% to 94.2% respectively (Figure 11).



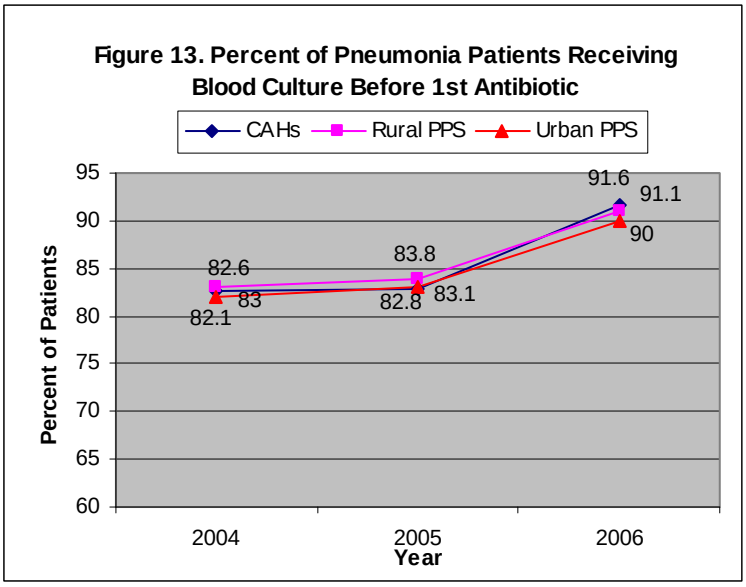
Calculations based on CAHs and PPS Hospitals with three years of data.

In 2004, among the three groups of hospitals, CAHs had the highest percent of pneumonia patients who received a pneumococcal vaccination (54.3% vs. 52.3% for rural PPS and 45.5% for urban PPS hospitals) (Figure 12). While CAH performance improved to 75.3% in 2006, rural PPS and urban PPS hospitals also improved to 76% and 74.7% respectively.



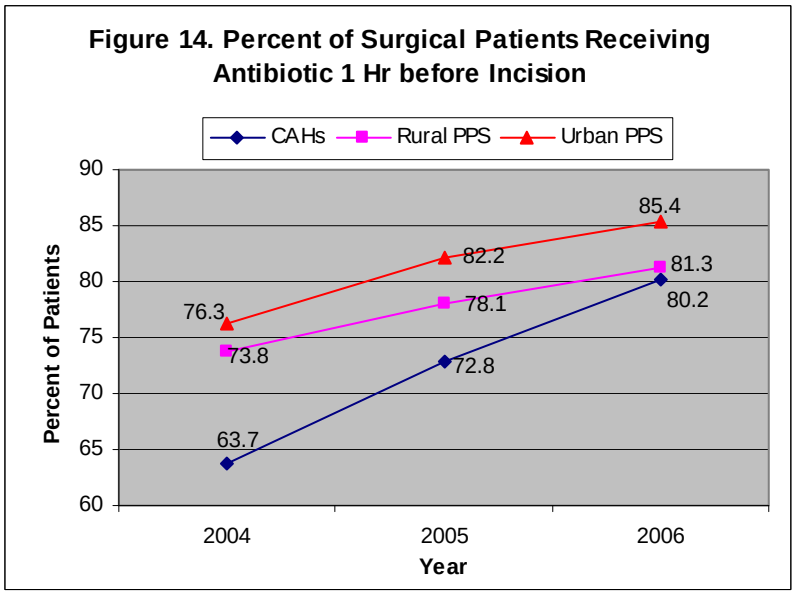
Calculations based on CAHs and PPS Hospitals with three years of data.

The percent of pneumonia patients in each of the three groups of hospitals who received a blood culture before their first antibiotic was similar in 2004, 2005 and 2006, as all groups improved (Figure 13).

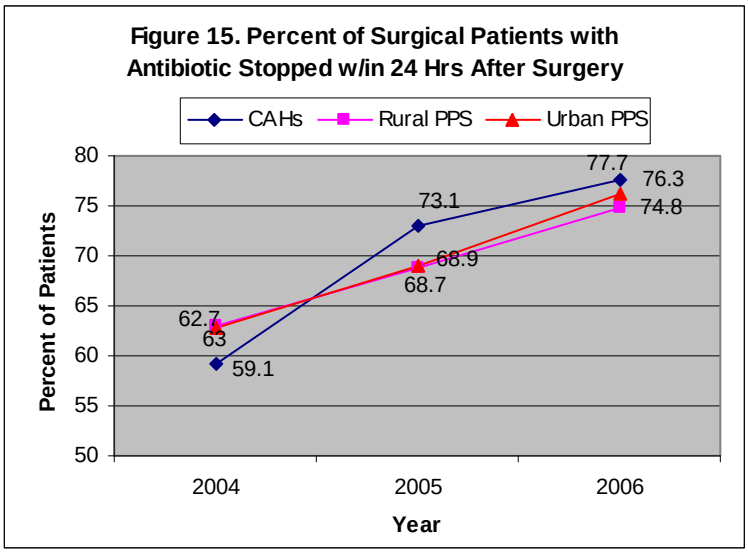


Calculations based on CAHs and PPS Hospitals with three years of data.

CAHs made progress at closing the gap with rural and urban PPS hospitals on the percent of surgical patients who received preventative antibiotics within one hour before their incisions (Figure 14) and surpassed PPS hospitals on the percent of surgical patients whose preventative antibiotics were stopped within 24 hours after surgery (Figure 15).



Calculations based on CAHs and PPS Hospitals with three years of data.



Calculations based on CAHs and PPS Hospitals with three years of data.

Quality Results for CAHs with 25 or More Patients per Measure

As shown earlier in Table 3, for 2006 discharges, few CAHs have 25 or more patients per measure for the AMI measures, two heart failure measures (smoking cessation and ACE inhibitor/ARB for LVSD), and one pneumonia measure (influenza vaccination). For the other measures, we calculated the percent of patients receiving recommended care individually for each CAH that had 25 or more patients in the denominator for each measure, and then calculated the mean, median, standard deviation and range of scores for this group of CAHs (i.e., using the "average of averages" method described on p. 3). With the exception of the oxygenation assessment measure, performance varied considerably *within* the group of CAHs (Table 10). On four measures, individual CAH scores ranged from 0 to 100%. The amount of variation in individual CAH scores is so large that it is extremely unlikely to have happened just by chance.

Table 10
Distribution of Individual CAH Scores
Among CAHs with 25 or More Patients Per Measure for 2006
(N = 598)

		Number of CAHs with > 25 patients in denominator	Percent of patients receiving recommended care[1]			
Condition	**Measure**		**Median**	**Mean**	**Std. Dev.**	**Range**
Heart Failure	Discharge instructions	244	68.0	63.6	25.9	0 -100
	Assessment of LVS	388	77.8	73.2	21.9	0 -100

Table 10
Distribution of Individual CAH Scores
Among CAHs with 25 or More Patients Per Measure for 2006
(N = 598)

		Number of CAHs with > 25 patients in denominator	Percent of patients receiving recommended care[1]			
Condition	**Measure**		**Median**	**Mean**	**Std. Dev.**	**Range**
Pneumonia	Oxygenation assessment	579	100.0	99.3	2.2	76.9-100
	Pneumococcal vaccination	457	77.3	72.6	22.2	0 -100
	Blood culture prior to first antibiotic	280	92.2	91.0	6.7	57.7-100
	Smoking cessation advice	42	92.5	84.5	19.2	0 -100
	Initial antibiotic(s) within 4 hours	496	86.5	85.0	9.3	46.5-100
	Most appropriate initial antibiotic(s)	426	84.6	82.7	11.8	7.7-100
Surgical Infection Prevention	Preventative antibiotic(s) 1 hour before incision	168	84.4	79.8	15.4	18.5-100
	Received most appropriate preventative antibiotic(s)	101	96.2	91.4	14.3	10.0-100
	Preventative antibiotic(s) stopped within 24 hours after surgery	165	82.4	77.6	20.2	12.8-100

[1]Calculated only for CAHs that had 25 or more patients per measure.

DISCUSSION AND CONCLUSIONS

Over the past three years, the percent of CAHs participating in Hospital Compare has continued to increase, indicating that many CAHs see the value of taking part in a national effort to collect and publicly report on quality of care measures. However, participation rates continue to vary widely across states, and participating and non-participating CAHs still differ significantly on several organizational characteristics (e.g., average number of beds, accreditation status, type of ownership, and date of CAH certification).

In the Flex Monitoring Team National CAH Survey conducted in 2007, CAHs that did not report to Hospital Compare were asked about the reasons why they did not report. The three most important reasons cited for not reporting were an insufficient volume of patients; the fact that the hospital is not required by CMS to report; and insufficient staff time for chart review/data extraction (Casey, 2008).

CAHs that have participated in Hospital Compare for three years have significantly improved their performance on nearly all measures. At the same time, however, rural PPS and urban PPS hospitals also improved their performance. Thus, CAHs continued

to have lower scores relative to rural and urban PPS hospitals on several measures. They did not perform as well as rural or urban PPS hospitals for both AMI and heart failure over the three years. The results for the pneumonia and surgical infection prevention measures were mixed, with CAHs performing as well or better than PPS hospitals on some measures, and not as well on other measures.

Some statistically significant differences between groups of hospitals (e.g., on pneumonia measures) may not be of practical significance because the scores are high for all groups. Other differences are larger and indicate that CAHs still have room for substantial improvement, especially with regard to recommended care for AMI and heart failure patients. The variation *within* the group of CAHs with 25 or more patients per measure is further evidence of the potential for lower performing CAHs to improve the quality of care they provide. The persistence over time of significant differences between CAHs and PPS hospitals, especially for AMI and heart failure patients, as well as within the group of CAHs, presents a quality improvement challenge for CAHs.

The Office of Rural Health Policy (ORHP) encourages Flex programs to work with CAHs in their states on quality improvement, measurement and reporting. The current Flex program funding cycle (September 2008 – August 2009) includes a requirement that Flex Programs implement activities designed to increase the number of CAHs reporting to Hospital Compare, and where all CAHs in a state are participating in Hospital Compare, to use reported data to identify areas where CAHs can improve their performance and design activities to assist them (ORHP, 2008). This transition of the Flex program from conversion of hospitals to CAH status to an explicit focus on quality improvement was included in re-authorization of the Flex program in the Medicare Improvement for Patients and Providers Act passed by Congress in July of 2008 (H.R. 6331).

Many Flex State Programs have been active in this area for the past few years, and activities focused on quality and performance improvement were among those most frequently identified as successful Flex Program activities in a recent survey of State Flex coordinators (Gale et al., 2007). The identified state quality and performance initiatives included: 1) supporting participation in state and national quality and performance improvement initiatives; 2) patient safety programs; 3) benchmarking and performance improvement programs; and 4) unique state programs. For example, State Flex Programs are supporting CAH participation in national quality initiatives targeting specific medical conditions, regional programs encompassing multiple states, and single-state efforts.

In their 8th Scope of Work, Medicare Quality Improvement Organizations (QIOs) had a goal of increasing reporting of quality measure data by CAHs to Q-Net Exchange, the national QIO data warehouse. For 2006 discharges, in addition to the 812 CAHs that submitted data to Hospital Compare, 289 CAHs submitted data to Q-Net Exchange but did not allow the data to be publicly reported to Hospital Compare (based on unpublished data from the Oklahoma QIO, 2008). For the 9th Scope of Work, which begins in August 2008, the QIOs will not have a rural-specific task, but will be required

to offer help to a list of CMS-defined hospitals that have not performed well on specific quality measures. The lack of a rural-specific task for the QIOs is a concern to rural hospitals, especially CAHs, because of uncertainty about whether the QIOs will have adequate resources to assist these hospitals with quality measurement, reporting and improvement as they have in the past.

As previously noted (Casey and Moscovice, 2006; Casey, Burlew and Moscovice, 2007), efforts to improve CAH participation in Hospital Compare need to ensure that CAHs find the process useful for internal quality improvement as well as external reporting and benchmarking. The quality measures used need to be relevant to the small rural hospital environment and the volume of patients must be large enough for CAHs to have stable measures. Most measures in the current Hospital Compare measure set are generally relevant for small rural hospitals. However, some measures involve procedures that are rarely performed in small rural hospitals (e.g., PCI). Other measures, such as the surgical care improvement measures, are relevant for a subset of small rural hospitals that perform these types of surgeries.

CMS is continuing to add inpatient measures to the RHQDAPU program for PPS hospitals and Hospital Compare. For the Fiscal Year 2008 update, six more quality measures were added, including AMI and heart failure 30-day mortality rates, three surgical care improvement measures, and the HCAHPS patient experience of care survey, for a total of 27 measures (Medicare Program, 2008). Two more surgical care improvement measures and the pneumonia 30-day mortality measure will bring the total to 30 measures for FY 2009. For FY 2010, CMS has proposed adding an additional 43 measures. To receive the full annual update to their outpatient PPS payment rate beginning in Calendar Year 2009, PPS hospitals also will be required to submit data for five outpatient quality measures for acute myocardial infarction/chest pain and two measures for surgical care improvement (Medicare Program, 2007). Some of the new and proposed measures address conditions that are commonly treated in CAHs (e.g., nursing sensitive measures, AMI Emergency Department/outpatient measures) while others address procedures not usually performed in CAHs (e.g., cardiac surgery).

Low volume remains a problem for calculating a number of quality measures, especially AMI measures, at the individual hospital level, and also limits the usefulness of some new measures added to Hospital Compare, such as 30-day mortality rates for AMI and heart failure. Low volume and the relevance of measures for small hospitals also are issues for other public and private reporting systems. Additional research is needed to evaluate alternative methods of assessing and comparing quality performance at the hospital level for small rural hospitals, such as Bayesian statistical models and composite measures (Davidson et. al., 2007; O'Brien et. al., 2008; Drye and Chen, 2008). Identification of high performing CAHs would allow their successful strategies and best practices to be replicated in other hospitals that need to improve the quality of care they provide.

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Appendix A: ACRONYMS USED IN THIS REPORT

Critical Access Hospital (CAH) 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 is a hospital that was closed within the previous ten years; or is a rural 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 by the State in the State plan 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 beds for acute inpatient or swing bed care; and
- Provides an annual average length of stay of less than 96 hours per patient for acute care patients.

Federal Office of Rural Health Policy (ORHP)
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/

Medicare Rural Hospital Flexibility Program (Flex 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.

Prospective Payment System (PPS)
Section 1886(d) of the Social Security Act sets forth a system of payment for the operating costs of acute care hospital inpatient stays under Medicare Part A based on prospectively set rates. Under the inpatient prospective payment system (PPS), each case is categorized into a diagnosis-related group (DRG). Each DRG has a payment weight assigned to it, based on the average resources used to treat Medicare patients in that DRG. The base payment rate is divided into a labor-related and non-labor share. The labor-related share is adjusted by the wage index applicable to the area where the hospital is located. This base payment rate is multiplied by the DRG relative weight. Hospitals that treat a high-percentage of low-income patients receive a percentage add-

on payment, the disproportionate share hospital (DSH) adjustment. Approved teaching hospitals receive a percentage add-on payment for each case paid through IPPS. Finally, for outlier cases that are unusually costly, the PPS payment is increased.

Quality Improvement Organizations (QIOs)
Under the direction of CMS, the Quality Improvement Organization (QIO) Program consists of a national network of 53 QIOs, responsible for each U.S. state, territory, and the District of Columbia. QIOs work with consumers and physicians, hospitals, and other caregivers to refine care delivery systems to make sure patients get the right care at the right time, particularly patients from underserved populations. The Program also safeguards the integrity of the Medicare Trust Fund by ensuring that payment is made only for medically necessary services, and investigates beneficiary complaints about quality of care.

To achieve the vision of the QIO Program, the right care for every person every time, the Program assists providers in transforming quality to make healthcare: safe, effective, patient-centered, timely, efficient, and equitable. Through QIOs and End-Stage Renal Disease Networks, and in partnership with other stakeholders, the Program assists providers in transforming healthcare quality, and protects beneficiaries and the Trust Fund, using the following strategies: 1) measure and report performance; 2) adopt healthcare information technology and use it effectively; 3) redesign process; 4) transform organizational culture; and 5) beneficiary protection. Additional information is available at: http://www.cms.hhs.gov/QualityImprovemen-rgs/