IMPACT OF CAH CONVERSION ON HOSPITAL FINANCES AND MIX OF INPATIENT SERVICES

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Executive Summary

Introduction

Although previous research has amply explored the effect of the Flex Program on Critical Access Hospitals' (CAH) financial performance, there is little research to demonstrate how conversion to a CAH has affected inpatient service mix. The importance of examining service mix is that any changes could reflect changes in access to care. The study presented in this report examines pre- and post-conversion data for hospitals that became CAHs during the first three years of the Flex Program in order to understand how, if at all, CAH conversion affects not only hospital finances, but also inpatient service mix.

Research questions addressed in this study include:

1. How does conversion to CAH status affect hospital revenues, profitability, and resources (e.g., staffing, beds)?

2. Are there changes in the volume or scope of inpatient services provided to Medicare patients following conversion to CAH status?

3. Do these effects vary according to the timing of CAH conversion (i.e., earlier vs. later converters)?

4. Are these effects sustained over time, or does the CAH move back toward the baseline level after any initial conversion effect?

Analytical Approach

This study follows three cohorts of CAHs over time, corresponding to the first three years of CAH conversions, 1999 through 2001. For each cohort, we identified a similar set of rural hospitals that were not CAHs to serve as control hospitals. For each cohort of hospitals, two types of analyses were conducted: a financial analysis an analysis of hospital services mix.

Analyses of Financial Impact: We compared financial performance and resources for the year preceding and the year following conversion, relative to the conversion year. Using data from the 1998-2002 Medicare Cost Reports we derived financial performance data by aggregating and averaging for CAHs (in each cohort year) as well as controls the following measures: change in outpatient and inpatient revenue; outpatient revenue as a proportion of total revenue; total margin; change in hospital beds; revenue per bed; change in full-time equivalent (FTE) hospital employees; change in total salaries, and total salaries per FTE.

Analyses of Hospital Services: Information on the inpatient services provided by each study hospital was derived from the 1998 to 2002 100% MEDPAR files. Using a finder file containing all Medicare provider numbers ever used by our study hospitals (e.g., both the CAH ID number and the Medicare ID number(s) used by the CAH prior to conversion), we pulled records for all

discharges from any of our study hospitals in any of the study years. We then used information on the patient's DRG to classify each discharge as: (1) basic medical care; (2) complex medical care; (3) general surgery; or (4) specialty surgery. Estimates of total number of discharges; inpatient days; basic, complex medical and surgical care discharges; discharges by selected Diagnostic Related Groups, were estimated for each of the CAHs in each cohort and for control hospitals. T-tests were used to determine whether differences across waves as well as across cohorts and controls were significantly different.

Results – Resources and Financial Effects

- Hospitals that converted to CAHs in 1999 reduced their number of beds by 38 percent; similarly, those that converted in 2000 and 2001 reduced their bed size by one-third. These appear to be one-time reductions.

- Substantial reductions in the number of FTEs occurred in hospitals that converted to CAHs. These reductions (in some cases one-fourth of staff was cut) did not occur immediately, but in the year following conversion.

- Conversion to CAH status had a dramatic effect on hospital profitability. Relative to the year prior to conversion, hospitals experienced large increases in their total margins immediately following conversion to a CAH.

- Total salaries paid by the hospital increased in both years following conversion. This growth in salaries, combined with the staffing reductions that were occurring by the second year of conversion, led to dramatic increases in average salary per FTE.

- Increases in revenue, combined with a reduction in the number of beds led to large increases in average revenue per bed among CAH converters.

Results - Services and Case-mix

- All three waves of CAH converters experienced large declines in their number of Medicare inpatient discharges in the year following conversion; this reduction persisted in subsequent years. In contrast, control facilities experienced sizeable expansions in annual inpatient Medicare caseload.

- Conversion to CAH status did not change the relative proportion of medical vs. surgical care provided. One notable exception was that the first wave of converters saw a significant increase in their share of basic medical care immediately following conversion. In subsequent years, their basic medical care share drifted back toward pre-conversion levels, and the changes experienced by CAHs were not significantly different than the changes of controls.

- All three waves of converters provided care in a smaller number of DRGs after conversion, whereas controls experienced slight expansions in their DRG base over the same comparison

periods. These reductions were sustained for several years after the conversion for cohorts that could be followed beyond the initial conversion period.

- Control facilities derived lower proportions of their Medicare caseload from pneumonia, heart failure, COPD, or stroke (the most common conditions treated by small rural hospitals) than their counterparts that converted to CAH status.

Discussion

Findings from this study were consistent in many ways with findings from several previous studies dealing with the impact of CAH conversion on hospital services. For instance, hospitals were in a stronger financial position following conversion to CAH status. These hospitals experienced growth in their total margins. Moreover, average total margins in post conversion years were slightly higher or comparable for CAH converters compared to control hospitals.

Following conversion to a CAH, hospitals also experienced reductions in Medicare inpatient volume (or the number of hospital discharges) as well as total inpatient days - both relative to the period prior to conversion and to control hospitals. Indeed, these results are not surprising given bed size requirements and the 96-hour average stay limit imposed by the Rural Hospital Flexibility Program legislation. CAHs relied more on outpatient revenue than did control hospitals; however, changes in outpatient revenue as a proportion of total revenue appeared marginal over time.

Despite the reductions in the relative importance of the inpatient component, there was little change in the basic composition of inpatient services, namely medical vs. surgical procedures or basic vs. complex services. With the exception of a temporary increase in the proportion of care that was basic medical observed for the very first wave of CAHs, conversion to CAH status was not generally associated with a change in the proportion of cases falling into these very broad categories.

Delving deeper, however, to examine individual DRGs, we do see evidence that CAH conversion was associated with some narrowing of the scope of inpatient care. More specifically, all waves of converters experienced a decline in the number of different DRGs in which they provide services, while over the same time period, all control groups saw growth in this figure. This finding may reflect the fact that CAHs now need to make more strategic admission decisions in order to ensure that they remain within the program limits on average length of stay (i.e., they would be less likely to admit a patient whose LOS is expected to be much longer than the average target LOS). Reductions in the number of patients may also naturally result in a decline in the number of different types of patients treated.

We also find evidence indicating that CAHs have increased their focus on the types of cases most commonly treated by smaller rural hospitals (i.e., pneumonia, heart failure, COPD, and stroke), whereas all control groups are exhibiting declines in the proportion of their inpatient cases that are for these conditions. When taken together, these results indicate that – at least in the initial years following conversion – these first three waves of CAHs retained their focus on basic medical care and a fairly limited set of inpatient services.

Interpretation of these results is difficult; although the finding that there were only marginal changes in the proportion of cases that are medical vs. surgical could indicate that access to essential services may not have changed, the narrowing of DRG categories may suggest that patients in certain diagnostic groups may have less access to inpatient care following conversion to a CAH. It is possible that subsets of patients who at one time may have been treated in an inpatient setting are now being referred to outpatient care. Additional study of these issues will be important if we are to understand whether or not conversion to CAH status affects access to care.

IMPACT OF CAH CONVERSION ON MIX OF INPATIENT SERVICES AND HOSPITAL FINANCES

Introduction

Much of the evidence to date regarding the impact of conversion to critical access hospital (CAH) status has come from the work of the Flex Program Monitoring Team, a consortium of research centers funded by the Office of Rural Health Policy (ORHP) to monitor the implementation of the Flex Program. Early in the program, this team used Medicare Cost Report data to examine the financial impacts for hospitals that became CAHs during the first two years of the Flex Program (Moscovice et al., 2004; Stensland et al., 2004). Results showed increased revenue and improved profitability following CAH conversion, with revenue gains being particularly striking on the outpatient side. Evidence regarding changes in capital expenditures was more mixed, but suggested that these expenditures may increase after conversion, albeit not immediately.

More recently, members of the Monitoring Team have analyzed a comprehensive set of financial measures (Pink et al., 2006) for a much larger group of converting hospitals and found that conversion is associated with improvements in profitability (total margin, cash flow margin, and return on equity), liquidity (current ratio, days cash on hand, and days revenue in accounts receivable), and the ability to meet debt obligations (Holmes et al., 2006). Results further suggest that hospitals first see an improvement in profitability, and under these conditions finance additional capital improvements, a finding that is consistent with earlier results from the first waves of converters.

Similar positive impacts on financial performance were found in several other studies conducted for individual states. Chen et al. (2004) applied multivariate analysis to financial data from 45 Nebraska hospitals that had become CAHs during FY 2000 and 2001, and documented statistically significant increases in total margins, return on equity, current ratio, and cash flow to total debt following conversion. An analysis of 12 early converting hospitals in Oklahoma likewise showed large gains in profitability (Doeksen, 2002), and a more recent study of 34 CAHs in Illinois found improved financial performance and higher capital investments (Lewis et al., 2006).

Many of these studies also speak to how conversion affects the composition and organization of the care provided by the hospital. For example, the analyses of Cost Report data by the Monitoring Team showed that early converters expanded their provision of outpatient and swing bed services (both of which are reimbursed on a cost basis), while divesting themselves of home health agencies and skilled nursing facilities (which were not eligible for cost-based reimbursement). At the same time, these facilities were using their improved financial status to expand staffing and increase salaries and benefits. Subsequent analysis of data from several surveys of CAHs by this same research team confirmed these general tendencies. This work showed that many CAHs added or expanded services in areas not dependent on inpatient capacity – such as specialty clinics, outpatient rehabilitation, outpatient surgery, radiology and

laboratory services, swing beds, and rural health clinics – while reducing their provision of home health care and obstetric services (Gregg et al., 2002; Hartley and Loux, 2005). The Illinois study also found expansions for outpatient services and specialty clinics, as well as increases in the number of staff in direct patient care positions. In contrast, the Oklahoma study (which focused on a smaller number of initial converters) found slight reductions in staffing and payroll. As expected given the constraints of the CAH program on number of beds and length of stay, this study also documented declines in the number of licensed beds, average daily census, and average length of stay.

The study presented here builds upon this earlier work by examining pre- and post-conversion data for hospitals that became CAHs during the first three years of the Flex Program in order to understand whether and how CAH conversion affects not only hospital resources, finances, but also inpatient service mix. As with the earlier work, our financial information is derived from the Medicare Cost Reports. Unlike previous studies, however, we further utilize Medicare inpatient claims data (rather than survey data) to investigate the extent to which the amount and type of inpatient care provided by CAHs changed after conversion.

Research Questions

Research questions addressed in this study include:

1. How does conversion to CAH status affect hospital revenues, profitability, and resources (e.g., staffing, beds)?

2. Are there changes in the volume or scope of inpatient services provided to Medicare patients following conversion to CAH status?

3. Do these effects vary according to the timing of CAH conversion (i.e., earlier vs. later converters)?

4. Are these effects sustained over time, or does the CAH move back toward the baseline level after any initial conversion effect?

Analytical Approach

Data Sources: Data used for this study include the following:

- a **listing of CAHs**, obtained from the University of North Carolina (UNC) Sheps Center, identifying all hospitals certified as CAHs as of the end of February 2006;

- the 1997 **PPS Impact File**, the 1997 **Provider of Services File**, and the 1998 **Area Resource File** – to describe baseline characteristics of hospitals and market areas, and to identify cohorts of control hospitals;

- the 1997 – 2002 **Medicare Hospital Cost Report Files** – for information on hospital

costs and other hospital characteristics; and

- the **100% MEDPAR Files** from 1998 through 2002 – for information on the study hospitals' Medicare inpatient volume and service mix.

Construction of Analytic Files

This study follows three cohorts of CAHs over time, corresponding to the first three years of CAH conversions, 1999 through 2001. For each cohort, we identified a similar set of rural hospitals that were not CAHs as control hospitals. Specification of control hospitals is described below. Our observation period extends from 1998 through 2002, providing a year of baseline data prior to the first conversions and up to three follow-up years after conversion.

o **Creation of the Master List of Hospitals -** To begin the process of identifying study hospitals, we used data from the 1997 Medicare Hospital Cost Report, the 1997 Provider of Services File, and the 1997 PPS Impact File to create a master list of all hospitals certified by Medicare and compiled information about each facility. We also used data from the 1998 Area Resource File to add information about the county in which each hospital was located.

o **Identification of CAH Cohorts -** We next merged this master list of hospitals with the UNC Sheps Center list of hospitals certified as CAHs through the end of February 2006 in order to identify which Medicare certified hospitals had subsequently become CAHs. CAHs were flagged according to their year of conversion. Hospitals converting to CAH status in 1999, 2000, or 2001 comprise Wave 1, Wave 2, and Wave 3, respectively, of treatment hospitals. One hospital converting in late December 1998 was grouped with 1999 converters, and one with missing data for the conversion date was eliminated from the study. Rural Primary Care Hospitals (RPCHs) and Medical Assistance Facilities (MAFs) that were grandfathered into the CAH program also were dropped from the file because their pre-CAH experience was expected to be different from the pre-CAH experience of other converting hospitals. Of the 1,217 non-grandfathered CAHs on the UNC list, we found matches for 1,153 facilities in the hospital master file (a match rate of 95 percent).

o **Identification of Control Hospitals -** Control hospitals were identified from the remaining facilities in the hospital master file. In general, control facilities had to be short-term general hospitals with no more than 50 beds in 1997, be located in a rural (non-metropolitan) area, and not have been a MAF or RPCH. Control hospitals were defined as those that had never converted to CAH status as of the time that this project was initiated (2006).

The final step in creating the analytic file was to create dependent variables reflecting each study hospital's inpatient caseload and financial status. Methods for creating each set of variables are described below.

o **Cost Report Dependent Variables -** Variables to conduct analyses of the effects of CAH conversion on financial performance and resources (e.g., beds) were obtained or derived from the 1998-2002 Medicare Cost Reports. Data on financial performance and resources

were aggregated and averaged for CAHs in each conversion wave, separately, as well as for all hospitals in the control group. As indicated, the control group used in the financial analysis included hospitals that had not converted to a CAH as of 2006.

It is important to note that several variables were measured in absolute terms (e.g., margins), and other variables (e.g., hospital beds) were measured in terms of percent changes, to ensure comparability across waves and between cases and controls. Dependent variables included the following:

- change in outpatient revenue (1998 v. 1999; 1999 v. 2000; 2000 v. 2001);
- change in inpatient revenue (1998 v. 1999; 1999 v. 2000; 2000 v. 2001);
- outpatient revenue as a proportion of total revenue (1998, 1999, 2000, 2001);
- total margin (1998, 1999, 2000, 2001);
- change in hospital beds (1998 v. 1999; 1999 v. 2000; 2000 v. 2001);
- revenue per bed (1998, 1999, 2000, 2001);
- change in full-time equivalent (FTE) hospital employees(1998 v. 1999; 1999 v. 2000; 2000 v. 2001);
- change in total salaries(1998 v. 1999; 1999 v. 2000; 2000 v. 2001); and
- total salaries per FTE 1998, 1999, 2000, 2001).

o **Inpatient Caseload Dependent Variables:** Information on the inpatient services provided by each study hospital was derived from the 1998 to 2002 100% MEDPAR files. Using a finder file containing all Medicare provider numbers ever used by our study hospitals (e.g., both the CAH ID number and the Medicare ID number(s) used prior to conversion), we pulled records for all discharges from any of our study hospitals in any of the study years.

We then used information on the patient's DRG to classify each discharge as: (1) basic medical care; (2) complex medical care; (3) general surgery; or (4) specialty surgery. Basic medical DRGs contain procedures that a panel of rural primary care physicians judged to be appropriate for treatment by primary care physicians at very small rural hospitals. Complex medical admissions include all other medical DRGs. General surgery DRGs are those for which the physician panel felt that a majority of rural patients would be referred to a general surgeon, and specialty surgery DRGs are all other surgical DRGs. This classification was based on work originally conducted by Moscovice et al. (1993) and Stensland et al. (2001), and updated by the Walsh Center to make classification assignments for all DRGs that have been added to the inpatient prospective payment system since the original classifications were developed. Finally, these person-level data were aggregated to the hospital level, resulting in the following variables used to characterize the inpatient services provided by each study hospital in each year:

- total number of discharges;
- total number of inpatient days of care;
- average length of stay (days/discharges);
- total number of basic medical care discharges (and days);
- total number of complex medical care discharges (and days);
- total number of general surgery discharges (and days);

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- total number of specialty surgery discharges (and days);
- total number of discharges (and days) by Major Diagnostic Category (MDC);
- total number of discharges (and days) in medical DRGs;
- total number of discharges (and days) in surgical DRGs;
- total number of discharges (and days) for groups of DRGs commonly treated by small rural hospitals;
- total number of unique DRGs for which the hospital provided care; and
- total number of discharges occurring in DRGs for pneumonia, heart failure, chronic obstructive pulmonary disease, and stroke – these DRGs were the most frequent DRGs provided by all study hospitals in the baseline year 1998, accounting for more than 25 percent of all discharges in that year; thus, this variable measures the degree to which the hospital 'concentrates' on the types of cases most commonly provided by small rural hospitals.

Each of these variables was computed for each study hospital for each of the five calendar years in our study period (1998 through 2002).

Analyses of Cost Report Variables

We compared financial performance and resources for the year preceding and the year following conversion, relative to the conversion year. Financial performance was not tracked through additional years since the Cost Report files, particularly for the more recent years filed, contain a considerable amount of missing information and inaccuracies that we were unable to clean. Elimination of these records in an attempt to track financial performance through additional years would inordinately reduce sample size.

Determination of these time periods posed a methodological challenge since Cost Report data are based on a fiscal year. Many hospitals converted to a CAH at a point during, but not at the beginning of, their fiscal years. To ensure comparability for hospitals converting during different waves, we designated the day on which a hospital converted to CAH status as the start of the conversion year. "Pre" and "post" years were defined in relation to this date. Thus, the first "post" year included a period of 365 days after the date that the hospital became a CAH, and the second "post" year included the next 365 day-period. Likewise, the pre-conversion year was modified to begin exactly 366 days prior to the date of conversion, ending on the day that immediately preceded the day of conversion. Multiple years of Cost Report data were combined to construct financial measures for these year-long periods, with data for each contributing Cost Report proportionately adjusted to correspond to the number of days in the analytic year.

Financial data for control hospitals were reported by fiscal year and, while comparable measures were collected or estimated, analyses reflect changes occurring between the start and end of each fiscal year. Time periods used in this portion of the financial analyses were therefore not comparable for CAH converters and controls.

Analyses for Inpatient Caseload Variables: For all inpatient caseload analyses we computed each CAH's change in the dependent variable over a specified observation period spanning the conversion, then employed t-tests to determine whether the mean change computed for CAHs

differed significantly from the mean change computed over the same period for the relevant control group hospitals. We also used t-tests to examine differences in the mean changes for CAHs by conversion wave.

With five complete calendar years of data, the post-conversion observation period *for this portion of the analysis* will vary from one to three years, depending on the year of the CAH conversion (the conversion year is omitted from the analysis since data from that calendar year will represent a mix of experiences as a PPS facility and a CAH). So, for example, analysis for Wave 1 converters will include one-, two-, and three-year follow-up periods, and the one-year changes will be computed using 1998 (baseline) and 2000 data (one year post conversion), two-year changes will be computed using 1998 and 2001 data, and the three-year changes will use 1998 and 2002.

Results: Comparison of Baseline Characteristics

Table 1 compares various baseline characteristics of hospitals that became CAHs during 1999 through 2001 to control hospitals. Results are presented by CAH conversion wave.

Hospitals that converted in any of the first three waves were significantly less likely than controls to be for-profit facilities and more likely to be government owned. No statistically significant differences were noted in the proportion of study hospitals that were sole community or teaching hospitals. Results show clearly that the earliest converters were in serious financial trouble prior to conversion in 1999, with 60 percent experiencing a net operating loss in 1997.

Table 1. Comparison of Baseline Data for CAHs and Control, by Year of Conversion				
	1999 CAH	**2000 CAH**	**2001 CAH**	**Control**
Number of Hospitals	64	184	222	285
% Government Owned	50.0 [a]	59.2 [a]	48.0 [a]	46.3
% Non-Profit	48.4 [a]	38.0 [a]	48.0 [a]	42.1
% For Profit	1.6 [a]	2.7 [a]	4.1 [a]	11.6
% Sole Community	34.4	27.7	36.2	30.9
% Teaching Hospital	0.0	0.0	1.8	1.4
% with Net Loss in 1997	60.9 [a]	46.7	37.6	40.4
Medicare Days/Total Days	66.3	61.4	63.4	61.2
Medicaid Days/Total Days	8.6	7.9 [a]	8.3 [a]	11.7
Total Hospital Beds	30.4 [a]	32.1 [a]	35.8	35.5
Total ICU & CCU Beds	0.2 [a]	0.7 [a]	1.2	1.7

[a] Significantly different from value for hospitals that never became a CAH, 95% confidence level.

Converting facilities had slightly smaller Medicaid shares relative to their controls, and did not exhibit significant differences in their Medicare shares. Both 1999 and 2000 converters had

fewer beds, both overall and in intensive care units. Year 2001 converters were much more similar to its control group with respect to the number and type of beds.

Results: Impact of CAH Conversion on Hospital Finances, Staffing & Beds

Hospital Beds: Not surprising given limitations on the number of beds that a CAH may operate, converters reduced the number of hospital beds by a substantial percentage between their baseline year and their initial conversion year. As indicated in Table 2, on average, hospitals that converted to

Table 2. Change in the Number of Hospital Beds for CAH Converters and Controls				
Conversion Year	n	1998-1999	1999-2000	2000-2001
1999	46	-38.1%	-4.3%	
2000	148		-32.5%	-1.0%
2001	183			-30.3%
Controls	234	0.0%	-5.1%	-2.7%

CAH status in 1999 reduced their number of beds by 38 percent relative to the pre-conversion year. Similarly, those hospitals that converted in 2000 and 2001 reduced their bed size by one-third. These appear to be one-time reductions occurring immediately upon conversion since in the second year after conversion the average change in beds was similar to that of control hospitals. The average number of beds among control hospitals remained stable between 1998

Table 3. Impact of CAH Conversion on Hospital Salaries and Staffing			
	1998-1999	1999-2000	2000-2001
FTE - Hospital			
1999 converters	-6.3%	-19.9%	
2000 converters		1.7%	-24.5%
2001 converters			-2.0%
Controls	3.9%	3.2%	0.9%
Total Salaries			
1999 converters	4.7%	9.8%	
2000 converters		6.6%	9.0%
2001 converters			8.3%
Controls	5.2%	7.0%	6.9%
Salary/FTE			
1999 converters	3.3%	27.7%	
2000 converters		-0.2%	34.0%
2001 converters			4.3%
Controls	4.0%	2.9%	5.2%

and 1999, but decreased by about 5 percent between 1999 and 2000, and by almost 3 percent between 2000 and 2001.

Hospital Staffing: With reductions in the number of beds, hospitals converting to CAH status also reduced the number of full-time equivalent (FTE) staff employed by the hospital (Table 3). Interestingly, only modest changes were observed during the initial conversion year, but more dramatic reductions in the number of FTEs occurred in the second year following conversion. Hospitals that converted to CAH status in 1999 reduced the number of FTEs by only 6 percent relative to the pre-conversion year, but by one-fifth in the following year. Hospitals converting to a CAH in 2000 actually increased their FTEs by about 2 percent in the first conversion year, but cut FTE staff numbers by one-fourth in the second conversion year. Hospitals that became a CAH in 2001 experienced a 2 percent reduction in FTEs the year of conversion. In contrast, control hospitals experienced modest increases in staffing throughout this period.

Despite reductions in staffing, total salaries paid by the hospital increased in both years following conversion. This growth in salaries, combined with the staffing reductions that were occurring by the second year of conversion, led to dramatic increases in average salary per FTE

in the year following conversion. For both 1999 and 2000 converters, average salary per FTE increased by around one-third. In comparison, average salary per FTE increased only modestly for controls in this three year period.

Inpatient and Outpatient Changes in Revenue: On average, all hospitals that became CAHs experienced an increase in inpatient revenue relative to the year prior to conversion (Table 4). For instance, 1999 converters experienced an 8.5 percent increase in revenue in this initial year, and while 2000 converters experienced only a 1.3 percent increase during the conversion year, their inpatient revenue increased by 7.2 percent in the next year. Over the period examined, however, the percentage increase in inpatient revenue tended to be higher for control hospitals than for any CAHs other than the initial wave of converters.

Table 4. Change in Inpatient and Outpatient Revenue for CAH Converters and Controls			
	1998-1999	1999-2000	2000-2001
Inpatient			
1999 converters	8.5%	-0.7%	
2000 converters		1.3%	7.2%
2001 converters			4.7%
Controls	2.4%	8.8%	9.4%
Outpatient			
1999 converters	23.4%	1.0%	
2000 converters		14.3%	9.2%
2001 converters			19.0%
Controls	15.2%	10.8%	13.1%

Outpatient revenue increased at a substantially faster rate than did inpatient revenue. As noted in Table 4, outpatient revenue increased by 23 percent among 1999 converters, 14 percent among 2000 converters, and 19 percent among 2001 converters – substantially outpacing the rates of increase seen for control hospitals during the same period.

Regardless of conversion year, CAHs obtained nearly 60 percent of their total revenue through the provision of outpatient services (Table 5). Notably, this proportion did not change substantially relative to the pre-conversion year. In comparison, control hospitals obtained about 50 percent of their revenue from outpatient services.

Table 5. Outpatient Revenue as a Percent of Total Revenue			
	1999	2000	2001	2002
1999 converters	57.5%	59.8%	59.8%	
2000 converters		57.6%	60.4%	60.4%
2001 converters			57.3%	59.3%
Controls	50.1%	48.5%	49.9%	51.3%

Total Margins: Table 6 shows total margins for rural hospitals between 1998 and 2001. As indicated here, conversion to CAH status had a dramatic effect on hospital profitability. Relative to the year prior to conversion, hospitals experienced large increases in their total margins immediately following conversion to a CAH. As one example, among hospitals that converted in 2000, margins increased by almost 130 percent. In general, among 1999 and 2000 converters, margins were comparable or higher than controls in both the year of conversion and the following year.

Table 6. Total Margins for CAH Converters and Controls			
	1998	1999	2000	2001
1999 Converters	-5.8%	6.4%	1.6%	
2000 Converters		-3.4%	1.0%	2.2%
2001 Converters			4.3%	1.7%
Controls	1.4%	1.5%	1.0%	2.0%

The finding that margins increased dramatically following conversion is not particularly surprising since presumably hospitals chose to convert to CAH status and, hence, cost-based

reimbursement as a means to enhance financial performance.

Revenue per Bed: Increases in revenue, combined with a reduction in the number of beds led to large increases in average revenue per bed during the year of conversion. As shown in Table 7, a nearly 69 percent increase in revenue per bed was observed for hospitals converting in 1999, and 42 and 48 percent increases were observed for hospitals converting to CAH status in 2000 and 2001, respectively. In the years following conversion, changes in per-bed revenue were substantially more modest (due to stabilization in the number of beds), averaging nearly 6 percent among 1999 converters and 8 percent among 2000 converters. Likewise, in part because their number of beds remained relatively more stable throughout the time period, control hospitals experienced substantially lower rates of per-bed revenue increase – almost 4 percent in 1999, nearly 20 percent in 2000 and about 9 percent in 2001.

Table 7. Changes in Revenue per Bed for CAH Converters and Controls			
	1998-1999	1999-2000	2000-2001
1999 converters	68.6%	5.8%	
2000 converters		42.3%	8.4%
2001 converters			48.0%
Controls	3.8%	19.5%	8.7%

Results: Impact of CAH Conversion on Inpatient Volume & Service Mix

Patient Volume: Table 8 presents the results of our investigations into the impact of CAH conversion on the total volume of Medicare inpatient care provided by the hospital. Not surprisingly given the Flex Program limitations on the number of beds and the 96-hour stay rule, we find that CAH conversion is associated with large reductions in the number of inpatient cases. Even accounting for their much lower starting volume relative to control facilities, all three waves of CAH converters experienced large declines in their number of Medicare inpatient discharges in the year following conversion. For example, in the first year after conversion, 1999 converters eliminated some 56 Medicare stays. This reduction persisted in subsequent. At the same time, control facilities were typically experiencing sizeable expansions to their average annual inpatient Medicare caseload.

Table 8. Impact of CAH Conversion on Average Number of Inpatient Discharges*									
	1 Year After Conversion			2 Years After Conversion			3 Years After Conversion		
	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change
1999 converts	279	223	-56	279	227	-52	287	221	-66
Control	663	665	1 [a]	676	708	32 [a]	685	731	46 [a]
2000 converts	322	267	-55	322	267	-55			
Control	655	708	53 [a]	664	731	68 [a]			
2001 converts	364	26	-68						
Control	698	734	37 [a]						

[a] Mean Change for treatment group differs from control group (within conversion wave), 95% confidence level.
* Estimates are rounded to the nearest whole number.

Total Days of Care: Table 9, shows that the average total days of care provided to Medicare patients also fell precipitously for all three waves of converters and remained at lower levels throughout the study period, while controls experienced smaller reductions or increased over the same periods. These large declines in total days of care are likely to reflect elimination of some cases entirely combined with a lower LOS for remaining cases

Table 9. Impact of CAH Conversion on Average Total Days of Care*									
	1 Year After Conversion			2 Years After Conversion			3 Years After Conversion		
Year of Conversion	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change
1999	1427	688	-739	1427	723	-703	1474	706	-768
Control	3302	3233	-71[a]	3369	3377	8[a]	3394	3405	11[a]
2000	1604	897	-707	1604	918	-687			
Control	3260	3377	117[a]	3289	3405	116[a]			
2001	1731	1007	-724						
Control	3381	3419	38[a]						

[a] Mean Change for converters differs from control group (within conversion wave), 95% confidence level.
[b] Mean change for 2000 and 2001 converters differs significantly from 1999 converters, 95% confidence level.
* Estimates are rounded to the nearest whole number.

Discharges by Complexity and Service Type: Table 10 examines changes in the composition of Medicare inpatient care following conversion by looking at trends in the proportion of total discharges that were for basic medical services, complex medical services, general surgery, and specialty surgery. As expected, the vast majority of care provided at the small rural hospitals comprising our study population was for medical rather than surgical care, and within the medical category, care was much more likely to be for basic rather than complex services. Conversion to CAH status did not change this picture dramatically, with very few significant differences in the trends for CAHs vs. controls, and very small changes for either group. The one notable exception to this finding occurred for 1999 converters, who saw a significant increase in their share of basic medical care immediately following conversion (and consequently, small reductions in their shares of complex medical care and all types of surgery). In subsequent years, however, basic medical care volume drifted back toward pre-conversion levels, and the changes experienced by CAHs were not significantly different than the changes among controls.

Year of Conversion	1 Year After Conversion			2 Years After Conversion			3 Years After Conversion		
	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change

Table 10. Impact of CAH Conversion on Average Mix of Medicare Inpatient Services

Year of Conversion	1 Year After Conversion			2 Years After Conversion			3 Years After Conversion		
	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change
PERCENT (AVERAGE) OF DISCHARGES THAT ARE FOR PRIMARY MEDICAL SERVICES									
1999	65	69	4	65	68	2	65	67	2
Control	59	61	2	59	60	2	58	61	2
2000	66	66	0[a]	66	67	1			
Control	61	60	0	60	61	0			
2001	64	64	0[a]						
Control	60	61	0						
PERCENT (AVERAGE) OF DISCHARGES THAT ARE FOR COMPLEX MEDICAL SERVICES									
1999	31	29	-3	31	30	-2	31	31	-1
Control	33	32	-1	34	32	-1	34	32	-2
2000	30	30	0[a]	30	30	0			
Control	32	32	0	32	32	0			
2001	31	31	0[a]						
Control	32	32	0						
PERCENT (AVERAGE) OF DISCHARGES THAT ARE FOR GENERAL SURGICAL SERVICES									
1999	2	1	1	2	1	-1	2	1	-1
Control	4	4	0	4	4	0	4	3	-1
2000	2	2	0[a]	2	2	0			
Control	4	4	0	4	3	0			
2001	3	3	0[a]						
Control	4	4	0						
PERCENT (AVERAGE) OF DISCHARGES THAT ARE FOR SPECIALTY SURGICAL SERVICES									
1999	1	.8	0	1	1	0	1	1	0
Control	3	3	0	3	3	0	3	3	0
2000	1	1	0	1	1	0			
Control	3	3	0	3	3	0			
2001	2	2	0[a,b]						
Control	3	3	0[c]						

[a] Mean change for 2000 or 2001 converters differs significantly from mean change for 1999 converters, 95% confidence level.

[b] Mean change for 2001 converters differs significantly from mean change for 1999 converters, 95% confidence level.

[c] Mean change for wave differs significantly from mean change for control group (within conversion wave), 95% confidence level.

* Estimates are rounded to the nearest whole number.

Changes in the number of DRGs or Selected Conditions: As another measure of changes in the composition of inpatient care, we considered whether CAH conversion was associated with a change in the total number of different DRGs in which the facility provided care as well as changes in the proportion of admissions for pneumonia, heart failure, COPD, or stroke, the most common conditions treated by small rural hospitals. Results shown in Table 11 indicate some narrowing in the focus of care provided by hospitals after CAH conversion. For example, all three waves of converters provided care in a smaller number of DRGs after conversion, whereas controls experienced slight expansions in their DRG base over the same comparison periods.

These reductions were sustained for several years after the conversion for cohorts that could be followed beyond the initial conversion period.

Table 11. Impact of CAH Conversion on Average Number of DRGs* Treated									
	1 Year after conversion			2 years after conversion			3 years after conversion		
Year of Conversion	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change
1999	69	62	-7	69	62	-7	70	62	-8
Control	107	108	1[a]	108	112	4[a]	110	114	4[a]
2000	75	70	-5	75	70	-5			
Control	109	112	3[a]	110	114	3[a]			
2001	82	76	-6						
Control	112	114	2[a]						

[a] Mean change for wave differs significantly from mean change for control group (within conversion wave), 95% confidence level.
[b] Mean change for 2000 and 2001 converters differs significantly from mean change for 1999 converters, 95% confidence level.
[c] Mean change for 2001 converters differs significantly from mean change for 2000 converters, 95% confidence level.
* Estimates are rounded to the nearest whole number.

Likewise, as shown in Table 12, CAHs tended to become more focused on the 'bread and butter' types of cases - pneumonia, heart failure, COPD, and stroke - after conversion, while control facilities were deriving lower proportions of their Medicare caseload from these 4 DRGs. This change was especially notable for 1999 converters. However, following the first year after conversions, little change in the average percentage of patients with these conditions was noted.

Table 12. Impact of CAH Conversion on Percent of Discharges for Pneumonia, Heart Failure, COPD and Stroke DRGs									
	1 Year after conversion			2 years after conversion			3 years after conversion		
Year of Conversion	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change	Mean Pre	Mean Post	Mean Change
1999	29	34	5	29	32	-3	29	31	2
Control	28	27	-1[a]	28	26	-2[a]	27	26	-1[a]
2000	31	31	0[b]	31	31	0[b]			
Control	29	26	-3[a]	29	26	-2[a]			
2001	29	31	2[b]						
Control	27	26	-1[a]						

[a] Mean change for wave differs significantly from mean change for control group (within conversion wave), 95% confidence level.
[b] Mean change for 2000 and 2001 converters differs significantly from mean change for 1999 converters, 95% confidence level.
[c] Mean change for 2001 converters differs significantly from mean change for 2000 converters, 95% confidence level.
* Estimates are rounded to the nearest whole number.

Discussion

Findings from this study were consistent in many ways with findings from several previous studies dealing with the impact of CAH conversion on hospital services. For instance, hospitals were in a stronger financial position following conversion to CAH status. These hospitals experienced growth in their total margins. Moreover, average total margins in post conversion years were slightly higher or comparable for CAH converters compared to control hospitals.

Following conversion to a CAH, hospitals also experienced reductions in beds, Medicare inpatient volume (or the number of hospital discharges) as well as total inpatient days - both relative to the period prior to conversion and to control hospitals. Indeed, these results are not surprising given bed size requirements and the 96-hour average stay limit imposed by the Rural Hospital Flexibility Program legislation. CAHs relied more on outpatient revenue than did control hospitals; however, changes in outpatient revenue as a proportion of total revenue appeared marginal over time.

Despite the reductions in the relative importance of the inpatient component, there was little change in the basic composition of inpatient services, namely medical vs. surgical procedures or basic vs. complex services. With the exception of a temporary increase in the proportion of care that was basic medical observed for the very first wave of CAHs, conversion to CAH status was not generally associated with a change in the proportion of cases falling into these very broad categories.

Delving deeper, however, to examine individual DRGs, we do see evidence that CAH conversion was associated with some narrowing of the scope of inpatient care. More specifically, all waves of converters experienced a decline in the number of different DRGs in which they provide services, while over the same time period, all control groups saw growth in this figure. This finding may reflect the fact that CAHs now need to make more strategic admission decisions in order to ensure that they remain within the program limits on average length of stay (i.e., they would be less likely to admit a patient whose LOS is expected to be much longer than the average target LOS). Reductions in the number of patients may also naturally result in a decline in the number of different types of patients treated.

We also find evidence indicating that CAHs have increased their focus on the types of cases most commonly treated by smaller rural hospitals (i.e., pneumonia, heart failure, COPD, and stroke), whereas all control groups are exhibiting declines in the proportion of their inpatient cases that are for these conditions. When taken together, these results indicate that – at least in the initial years following conversion – these first three waves of CAHs retained their focus on basic medical care and a fairly limited set of inpatient services.

Interpretation of these results is difficult; although the finding that there were only marginal changes in the proportion of cases that are medical vs. surgical could indicate that access to essential services may not have changed, the narrowing of DRG categories may suggest that patients in certain diagnostic groups may have less access to inpatient care following conversion to a CAH. It is possible that subsets of patients who at one time may have been treated in an inpatient setting are now being referred to outpatient care. Additional study of these issues will be important if we are to understand whether or not conversion to CAH status affects access to care.

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