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Research Report

Does ACO Adoption Change the Health Workforce Configuration in U.S. Hospitals?

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BACKGROUND

An Accountable Care Organization (ACO) refers to a group of physician and other healthcare providers and suppliers of services, notably hospitals that form a collaborative network in order to reduce costs while improving quality of inpatient care, and thereby meet contractual requirements and targets set by third-party payers. Although the number of ACOs nationwide has been growing rapidly since they were first recognized in Medicare regulations in 2011, little is known about the way delivery systems adjusted to the change, and specifically about how those changes affect the health care workforce in hospitals).[1] The purpose of this report is to provide a descriptive analysis of workforce differences between hospitals that participate in an ACO and those that do not.

The most well-known type of ACO is the Medicare Shared Risk Program (MSPP). However, recent surveys suggest that commercial ACO contracts are rising rapidly. It is estimated that by the end of 2015 the number of lives covered by commercial ACO contracts was more than double the number of lives in Medicare ACOs – 17.2 and 8.3 million, respectively.[2]

Nearly all Medicare ACOs opted for one-sided risk contracts offered by CMS[i], whereby they would share savings with CMS if costs of the patient pool are below some threshold payment level, up to 50% of the spending difference. In addition, in order to be eligible to share in any savings generated, an ACO must meet the established quality performance standard that corresponds to its performance year.[3]

One idea put forth by experts was that to ensure better outcomes ACO hospitals would likely increase primary care clinicians, including nursing care staff.[4] The premises was the belief that an increase in

[i] Only 2% of ACOs opted for the two-sided risk model, where they split both losses and gains with CMS.

staffing would help ACOs to adjust to the new regulations and standards arising from the implementation of the ACA, and would help them gain legitimacy and credibility among payers and patients.[4]

Extending beyond the immediate transition of care, hospital engagement in care management of complex patients is associated with reduced readmissions.[5] Given that a relatively small portion of the population accounts for the majority of health care expenditures, identifying high risk patients, including patients with social service or behavioral health needs, and focusing care on that population is an important cost containment strategy.[6,7] This can take the form of developing disease registries to track patients with one or more chronic diseases[8] to complex algorithms to prospectively identify patients using claims data and other patient information.[9] The personnel handling these activities may be listed as data analysts, or they may have other titles such as medical assistants.[1]

While all of these activities would suggest an increase in nurse staff, as well as, possibly, care coordinators, data analysists, pharmacists, and others, the manner in which payments are determined may actually provide a disincentive for hospitals to spend on labor once they begin the program. Douven and colleagues point out that benchmark calculations of payment include the last three years of providers' spending, but that it is the most recent year that carries the greatest weight.[10] Thus, the incentives to increase spending are strongest in the last year prior to ACO adoption. They argue that providers that incur the greatest costs during the year before entering or renewing an ACO arrangement are actually rewarded, while providers with the lowest cost during the last year are in fact penalized.[22] Under these conditions, it is possible that joining an ACO would have the effect of reducing previously inflated staff levels in high-cost and high-benchmark ACOs.

Given the conflicting effects that ACO adoption may have on nursing and other staff hiring, coupled with the fact that incentives in commercial ACOs are not known, we believe that an exploratory analysis of staffing in ACO programs is warranted.

To conduct this preliminary analysis we used two different data sources as follows:

- First, we used an operations database maintained by Premier to examine a set of jobs that might be related to care coordination to see if ACO hospitals differed from non ACO hospitals in their use of each type of personnel. This analysis was limited to a cross sectional comparison for 2014, the only year for which Premier had tagged ACOs.
- Second, we used the American Hospital Association's (AHA) Survey of Care Systems and Payment to identify ACOs, and the AHA's regular annual survey to examine nurse staffing ratios in the two types of hospitals in 2013 and in 2014, the two years for which data is now available.

The methods and findings for each of these analyses is further detailed below in each section. We conclude with a section that lays out the next steps in this program of research and describes what we have learned about the relative strengths of our data sources for workforce research.

PART I: JOBS IN PREMIER DATA

Methods and Data

To examine the extent to which becoming an ACO, and the increased use of care coordination as documented above, might lead to new jobs or changes in the configuration of staff in hospitals, we compared hospitals in 2014 that were ACOs to those that were not. We used an operational database maintained by Premier Inc. that tracks labor hours, hospital units, and facility characteristics.

A total of 317 unique hospitals were included in 2014 data. The ACO flag variable was linked by Premier from American Hospital Association (AHA) 2014 Annual Survey. The sample included 135 hospitals that were ACOs, and 182 hospitals were non-ACOs.

Measures

Based on a review of job titles in the Premier data, we identified 16 jobs that might be affected by ACO status. These jobs included advanced practical registered nurse (APRN), physician assistant (PA), registered nurse (RN), licensed practical nurse (LPN), unlicensed assistive personnel (UAP), nurse assistive personnel (NAP), case manager and case management assistant, managed care coordinator, risk management, patient educator, social worker, medical social worker, clinical social worker, pharmacists, and pharmacy technician.

Hospital staffing was measured by annual average number of hours worked (including only regular and overtime hours) by each type of workforce examined. The labor hours were also adjusted by case-mix index adjusted total patient days, a similar measure used in previous nursing studies. Compared to full-time equivalent workers, this measure allowed us to capture the impacts of absences from work, as well as overtime hours.

We then conducted a cross-sectional analysis of ACOs staffing and used t-tests to compare staffing levels between ACOs and non-ACOs in 2014.

Results

As presented in Table 1, in 2014, ACOs and non ACO hospitals used similar levels of PA, UAP, NAP and APRN staffing (0.073 vs. 0.053, p=0.216; 1.053 vs. 1.142, p=0.242; 0.989 vs. 1.105, p=0.117; 0.167 vs. 0.169, p=0.938). However, ACOs used significantly lower level of RN but higher level of LPN staffing than non-ACOs in 2014 (3.891 vs. 4.772, p=0.000; 0.290 vs. 0.216, p=0.029).

In 2014, ACOs and non ACOs used similar levels of case manager and case management assistant staffing (0.122 vs 0.143, p=0.088). Likewise, ACOs used similar levels of managed care coordinator, risk management, and patient educator staffing as non-ACOs (0.011 vs. 0.016, p=0.364; 0.013 vs. 0.016, p=0.467; 0.018 vs. 0.019, p=0.692; 0.018 vs. 0.019, p=0.692). However, ACOs used lower levels of social workers, pharmacists, and pharmacy technician staffing than non-ACOs (0.076 vs. 0.097, p=0.028; 0.138 vs. 0.188, p=0.000; 0.169 vs. 0.198, p=0.005).

Table 1. Hospital staffing by ACO status, 2014

Occupation	Hours per CMI adjusted patient day				p-value
	ACO		Non-ACO		
	N	Mean	N	Mean	
PA	51	0.073	68	0.053	0.216
RN	110	3.891	154	4.772	*0.000*
LPN	106	0.290	134	0.216	*0.029*
APRN	78	0.167	123	0.169	0.938
UAP	103	1.053	150	1.142	0.242
NAP	104	0.989	149	1.105	0.117
Case management combined	92	0.122	122	0.143	0.088
Case manager	85	0.129	119	0.136	0.572
Case management assistant	14	0.023	9	0.039	0.346
Managed care coordinator	13	0.011	11	0.016	0.364
Risk management	29	0.013	17	0.016	0.467
Patient educator	49	0.018	53	0.019	0.692
Social workers combined	93	0.076	132	0.097	*0.028*
Social worker	76	0.061	115	0.081	*0.045*
Medical social worker	30	0.059	42	0.053	0.642

Clinical social worker	17	0.041	29	0.029	0.249
Pharmacy combined	97	0.298	146	0.359	*0.002*
Pharmacists	93	0.138	138	0.188	*0.000*
Pharmacy technician	93	0.169	134	0.198	*0.005*

Note: CMI Adjusted patient days = CMI* (Total Patient Days/(1 - (Gross Outpatient Revenue/Gross Patient Revenue))). PA=physician assistant, RN=registered nurse, LPN=licensed practical nurse, APRN=advanced practical registered nurse, UAP=Unlicensed Assistive Personnel, NAP=nurse assistive personnel.

Discussion

We are cautious in our interpretation of these results, given that the Premier data and the AHA ACO flag are both convenience sample. However, it is notable that there are no significant increases in hours for care coordinators, case managers, patient educators, or risk managers, as might have been expected. It is also notable that RN and UAP hours are lower in ACO hospitals than in non ACO hospitals, as are pharmacy and social worker hours.

These differences are the opposite of what we might have expected, given the evidence that higher RN staffing levels improve outcomes[11,12,13], and the increased interest in pharmacists for medication management[14] and social workers to help manage patients with challenges in the realm of social determinants[15]. They may suggest that ACO hospitals are engaged in cost containment strategies that include constraining staff growth.

Further analyses that includes additional years and multivariate regressions that can control for facility and regional characteristics are needed and will be conducted during the fall of 2016.

PART II: JOBS IN AHA DATA

The purpose of this second section of the report is to continue to explore workforce differences in ACO hospitals using the AHA Annual Survey Database, and the AHA Survey of Care Systems for the years 2013 and 2014. Henceforth we will refer to these as the 2013 and 2014 AHA and ACO surveys respectively.

From the AHA and ACO surveys, our 2013 data included information for 1,795 hospitals. Out of these 1,795 hospitals, we excluded 358 government hospitals, leaving us with 1,250 non-governmental, not-for-profit hospitals and 187 investor-owned for profit hospitals. We excluded government hospitals to date the literature does not address the role that federal/local hospitals in ACO. In later analysis we aim to include/compare in our analyses federal/local hospitals. Out of the resulting 1,437 private hospitals, therefore, 286 had "established or were part of an ACO", while 853 of them did not have any type of ACO arrangement[ii].

For the year 2014, both the AHA and ACO surveys included information for 1,697 hospitals. Out of these 1,697 hospitals, we excluded 317 government hospitals, leaving us with 1,239 non-governmental, not-for-profit hospitals, and 141 investor-owned for profit hospitals. Out of the resulting 1,380 private hospitals, 279 had "established or were part of an ACO", and 526 did not have any type of ACO arrangement.

[ii] For 298 of these hospitals, ACO status information was missing.

After merging our 2013 and 2014 information of private hospitals with ACO information for both years, our final dataset was composed by 403 hospitals[iii]. Out of those, 117 hospitals were part of an ACO in both years 2013 and 2014 (group #1 – always ACO), 268 hospitals were not part of an ACO in either 2013 or 2014 (group #2 – never ACO), 63 hospitals were not part of an ACO in 2013, but joined an ACO in 2014 (group #3) and finally 25 hospitals were part of an ACO in 2013, but reported having left their ACO arrangements by 2014 (group #4).

With regards to the rural/urban distribution of the hospitals described above, using US Census defined Core Based Statistical Areas, we determined that the number of rural hospitals was very small in all groups except the never-ACO group. It included 8 rural hospitals in group #1, 104 rural hospitals in group #2, 8 rural hospitals in group #3 and 6 rural hospitals in group #4.

In regards to the variety of shared savings programs pursued by ACO hospitals, the three most common shared savings arrangements in 2013 and 2014 were the following: commercial payer partnerships, Medicare shared savings programs, and joint Medicare shared savings programs together with commercial payer partnerships (see Table 2).

[iii] Out of 1380 non-governmental hospitals present in both years, 575 of them had missing ACO status information for either year.

Table 2: Distribution of Shared Savings Programs in 2013 and 2014

Shared Savings Program – 2013	#
Commercial Payer Partnership	34
Medicare Shared Savings Program	29
Pioneer Model	15
Medicaid Program	2
Medicare Shared Savings Program Commercial Payer Partnership	21
Medicare Shared Savings Program Pioneer Model Commercial Payer Partnership Medicaid Program	12
Pioneer Model Commercial Payer Partnership	7
Medicare Shared Savings Program Commercial Payer Partnership Medicaid Program	6
Pioneer Model Commercial Payer Partnership Medicaid Program	3
Commercial Payer Partnership Medicaid Program	1
Missing	12

Shared Savings Program - 2014	#
Medicare Shared Savings	50
Commercial Payer Partnership	28
Pioneer Model	5
Medicaid Program	4
Medicare Shared Savings Commercial Payer Partnership	33
Medicare Shared Savings Commercial Payer Partnership Medicaid Program	20
Medicare Shared Savings Pioneer Model Commercial Payer Partnership	6
Pioneer Model Commercial Payer Partnership	4
Medicare Shared Savings Pioneer Model Commercial Payer Partnership Medicaid Program	2
Pioneer Model Commercial Payer Partnership Medicaid Program	2
Commercial Payer Partnership Medicaid Program	2
Medicare Shared Savings Medicaid Program	1
Missing	23

As observed in Table 2, the distribution of ACO participating hospitals in different shared savings programs is complex and dynamic. A significant number of hospitals entered and exited the existing

shared savings programs just within the two-year observed period. Additionally hospitals may have multiple shared savings programs which can also change from year to year.

For the workforce analysis, we consider only hospitals in groups #1 (always ACO) and #2 (never ACO) as described above. We excluded the two groups of hospitals were ACO membership status changed between 2013 and 2014, because of small sample sizes which would prevent us from obtaining meaningful statistical comparisons.

We focus on the number of staff hours per adjusted patient day. Total patient days are adjusted by the hospital level proportion of inpatient and outpatient revenue, per AHA's methodology, and we then also adjusted for CMS' yearly case mixed indexes (CMI).

We use a modified measure of full-time equivalent employment developed by Spetz and colleagues.[16] They assume that productive hours per year are fewer than 2,080 and instead use 1,768 hours per year; this is equivalent to an 85% productive level over 52 weeks per year at 40 hours per week.

Based on staffing data available from the AHA, we focused this analysis on various levels of nursing staff: registered nurses (RNs), licensed practical nurses (LPNs), nursing assistive personnel (NAP) (the term used in the AHA survey), and advanced practice nurses (APNs). As discussed in the introduction, there is extensive research demonstrating that higher RN staffing levels result in better outcomes. LPN and APN staffing levels may affect RN workload and therefore may also affect outcomes. APNs do various types of tasks in hospitals and we know of no research suggesting APN staffing levels bear a relationship with outcomes. We include them simply as an additional point of interest that could be explored in future research.

Thus, for each type of nurse we use the following formula in order to calculate the number of hours per CMI adjusted patient day:

$$= \frac{\#\ \boldsymbol{of\ FTEs} * \mathbf{1786}\ \boldsymbol{hours}}{\boldsymbol{CMI\ adjusted\ patient\ days\ during\ a\ year}}$$

After calculating the average number of nursing hours for RNs, LPNs, NAPs and APNs, we then proceed to compare the absolute difference, as well as the percentage change across occupations among ACO and non-ACO hospitals between 2013 and 2014.

Results

As presented in Table 2, when comparing the baseline (2013) staffing levels for ACOs and non ACOs, we find that non ACOs have higher levels of LPNs and APNs. Given the higher proportion of rural hospitals in the non ACO group, this is not surprising. We know that nationwide employment of LPNs in hospitals is falling, although it is most dramatic in urban areas. We also know that employment of APNs is rising across the country, but especially in rural areas.[17]

In comparing changes in the two groups from 2013 to 2014, we find that the average number of RN and APN hours has fallen in the always-ACO group and that the changes are statistically significant. This finding was surprising, as discussed below, given the idea that ACOs may be more advanced in the organization of care than non ACOs.

We also find that LPN and NAP hours fell in both groups, while APN hours increased significantly in both groups, especially in the always-ACO group.

Table 3. Changes in Hospital staffing by ACO status, 2014										
Nurse Type	Average FTE Hours per CMI Adjusted Patient Day (mean & difference)									
	Always-ACO					Never-ACO				
	N	2013	2014	Diff	% Δ	N	2013	2014	Diff	% Δ
RNs	104	4.370	4.261	-0.109*	-2.5%	207	4.264	4.280	0.015	0.4%
LPNs	104	0.119	0.108	-0.011	-9.2%	207	0.363	0.347	-0.015	-4.4%
NAP	104	1.296	1.182	-0.114***	-8.8%	206	1.131	1.073	-0.057*	-5.1%
APNs	90	0.231	0.344	0.113***	48.9%	160	0.319	0.389	0.071***	21.9%
*- significant at the 10% level, **- significant at the 5% level, ***- significant at the 1% level										

Discussion

We are again cautious not to interpret our results as a definitive study of labor patterns among ACO/non-ACO hospitals, given the potential for sample selection bias and the fact that this is simply a descriptive analysis. Nevertheless, findings relating to the small drop in RN and the large increase in APN hours per patient day in ACOs echo our findings using Premier data for just one year (2014).

CONCLUSIONS

We were surprised that not only did there not appear to be major ACO related differences in the workforce either cross sectionally or when comparing changes across two years in the "always ACO" and "never ACO" groups. Indeed the early signs of directionality of change among those with ACO status are the opposite of what we would have anticipated. These two descriptive analyses suggests the need for further research with longer time series (more data), as well as, adjustments that take into account other important characteristics of hospitals.

ACO's are required to report quality outcomes and their payment is linked to results. Indeed, we know that ACOs that participated in the Medicare Shared Savings program in both 2013 and 2014 improved on 27 of 33 measures. [18]

Given, increased interest in pharmacists for medication management[19] and social workers to help manage patients with challenges in the realm of social determinants[20] makes the lower staffing levels of these groups of professionals in ACO hospitals unforeseen.

Even more surprising was the reduction in RN and APN hours among ACO hospitals, as compared to non ACO hospitals, given that there is such a strong body of research suggesting higher nurse staffing results in better outcomes. Moreover, nurse organizations, especially labor unions, have been advocating for various types of mandatory and voluntary nurse staffing laws. Indeed, California and Massachusetts now have mandatory laws, and 14 other states have either public reporting or staffing committee requirements that aim to push hospitals towards higher nurse staffing levels.[21] At the same time, recent research conducted by this team (forthcoming in HSR) using Premier data also shows a nationwide decline in RN and nurse support staff hours, suggesting that something important may be occurring.

With regard to reduced or constrained staffing, possible explanations to be explored in further research include the following:

- A suggested by Douven and colleagues, the existing ACO payment formula may lead hospitals to reduce spending just after joining ACOs. This may be due simply to the savings incentives, or it may be linked to the payment calculations which give the greatest weight to the year prior to ACO adoption.
- Hospitals in ACOs are expanding their market power and, therefore, may be less concerned about public reputation regarding nurse staffing, and perhaps even their nurse related quality outcomes;
- ACO hospitals are identifying ways to reduce labor costs without affecting outcomes;

- The reduction in RN staff could be related to the retirement of older nurses, and hospitals in certain regions may be having difficulty replacing them.
- It is possible that ACO hospitals are redeploying some RNs and support staff to other settings with partner organizations and they are therefore not captured in either data source.

The next steps in our research will be to use a longer longitudinal data set and multivariate regression analyses to control for a variety of facility and regional characteristics to ensure that our preliminary findings are robust. Among the control variables that should clearly be included in our next analysis are: rurality, local nurse supply, hospital market share, types of shared savings programs, and percent of patients covered under shared savings.

Reflections on the strengths and weaknesses of our data sources

One of the important objectives of this phase of our research is to fully comprehend these new data sources for workforce research. In the paragraphs that follow, we reflect on the relative strengths and weaknesses of Premier and AHA data sources that we have identified to date.

Premier Data

The Premier operational database captures information on more than 500 Premier membership hospitals that cover healthcare systems in all 50 states and the District of Columbia. It includes basic facility characteristics, department codes and descriptions, job titles and descriptions, and staffing information such as labor hours, expenses, and skill-mix category. GW has purchased 2010-2014 and 2015 will be provided to us soon. Premier collects clinical, financial, pharmacy, supply chain, and operational data from its member hospitals on a daily, biweekly, monthly, or quarterly basis. The data provide a unique opportunity to track hospital-based workforce, and in this instance it allows us to identify a variety of job titles across different hospital departments and specialty areas.

Hospital staffing was measured by calculating the annual number of total worked hours (including regular and overtime hours) for each of the selected jobs, adjusted by case-mix index adjusted total patient days. Compared to full-time equivalent workers, this labor hour measure allows us to capture the impacts of absences from work, and thus may reflect the actual hours that workers spend on assisting clinical tasks. Premier was able to link the ACO flag from AHA for us (we are not provided access to provider identifying numbers), allowing us to compare the differences in care coordination related workforce in hospitals.

The weakness of the Premier data is the small sample size, which may affect the statistical power to detect statistical differences. That is to say, while some of our results did not have significant differences, the magnitude of the estimates still provide practical implications. In addition, Premier's member hospitals are essentially a convenience sample of all U.S. hospitals and thus may not necessarily be representative of all U.S. hospitals. However, Premier's hospitals characteristics are still similar to the characteristics of U.S. community hospitals as reported by other national hospital databases,[iv] suggesting that our findings are likely to reflect hospital staffing trends nationwide. Lastly, the ACO flag linked from AHA indicates ACOs, being part of ACOs, however, it also indicates hospitals that are not ACOs but are actively thinking to become an ACO as the ACO flag. This may affect the accuracy of our estimates. Future study may need to exclude these hospitals out.

American Hospital Association (AHA) data

The AHA Annual Survey Database (ASDB) covers all U.S. community health hospitals and the response rates are high in each year. GW has purchased 2009-2014. This annual survey contains over 6,300

[iv] The proportion of teaching hospitals and average occupancy rate in our dataset is comparable to the national average, while our sample consists of a larger portion of not-for-profit, urban, and system-affiliated hospitals and hospitals with more staffed beds and admissions as compared to the national sample from the American Hospital Association Annual Survey and Healthcare Cost and Utilization Project data.

hospitals and almost 1,000 fields of information in the following categories: organization structure, facility characteristics, inpatient and outpatient utilization, staffing, and geographic indicators. Due to its reliability across time, the data are used for a variety of purposes. They are seldom used, however, to examine the hospital workforce. Two previous works we found are using AHA data as regression controls.[22,23] The AHA annual survey provides data on number of FTE for a smaller number of jobs than Premier. These include physician, dentists, medical residents, nurses, nurse assistive personnel, technicians, pharmacists, therapists, other clinical professionals, and support personnel.

The AHA Survey of Care Systems and Payment was established in 2013 to understand payment arrangements. GW purchased 2013-2015. The most important component of this survey is its focus on Accountable Care Organization (ACO) participation and structure. The survey identifies which hospitals are participating in ACOs, or are actively thinking to become an ACO. Using this information, we are able to link the AHA annual data workforce variable to the ACO flag created from the ACO survey and examine staffing variation by hospital ACO status.

In 2013, the survey was sent to all registered community hospitals (4,999) and received 1,517 responses from the field. Of these, 309 hospitals indicated they are part of an ACO. The respondent profile for the overall survey was broadly representative of the universe of U.S. hospitals, as indicated by the AHA.[24]

Both of the AHA surveys have limitations. First, the AHA ASDB does not distinguish between outpatient and inpatient registered nurses (RNs). Second, surveyed hospitals may use different definitions to calculate the number of FTE workers. Thirdly, when we convert the number of FTE nurses to annual nursing hours, we use a formula previously used by Spetz and colleagues in which they assume that one FTE nurse would work for 1,768 hours per year. Under this formula, potential work hours equal to 52 weeks per year at 40 hours per week and actual productive hours equal to 85% of potential hours.[71] This method yields similar results to Premier data.

Lastly, the ACO surveys' response rates are relatively low, resulting in the possibility of selection bias. In other words, hospitals that chose to answer the survey may differ from hospitals that did not answer it in ways that we do not understand. Future research will need to account for this issue.

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