Hospital Characteristics Associated With Achievement of Meaningful Use

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Abstract:

The objective of this study was to identify factors associated with hospitals that achieved the Medicare meaningful use incentive thresholds for payment under the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009. We employed a cross-sectional design using data from the 2011 American Hospital Association Annual Survey, including the Information Technology Supplement; the Centers for Medicare & Medicaid Services report of hospitals receiving meaningful use payments; and the Health Resources and Services Administration's Area Resource File. We used a lagged value from 2010 to determine electronic health record (EHR) adoption. Our methods were a descriptive analysis and logistic regression to examine how various hospital characteristics are associated with the achievement of Medicare meaningful use incentives.

Overall, 1,769 (38%) of 4,683 potentially eligible hospitals achieved meaningful use incentive thresholds by the end of 2012. Characteristics associated with organizations that received incentive payments were having an EHR in place in 2010, having a larger bed size, having a single health information technology vendor, obtaining Joint Commission accreditation, operating under for-profit status, having Medicare share of inpatient days in the middle two quartiles, being eligible for Medicaid incentives, and being located in the Middle Atlantic or South Atlantic census region. Characteristics associated with not receiving incentive payments were being a member of a hospital system and being located in the Mountain or Pacific census region.

Thus far, little evidence suggests that the HITECH incentive program has enticed hospitals without an EHR system to adopt meaningful use criteria. Policy makers should consider modifying the incentive program to accelerate the adoption of and meaningful use in hospitals without EHRs.

Article:

Despite the potential for interoperable electronic health records (EHRs) to positively affect healthcare delivery (Bates & Gawande, 2003; Kaushal, Shojania, & Bates, 2003; Kazley & Ozcan, 2008; Kazley & Diana, 2011), hospital adoption of the technology remains low, limiting the realization of these benefits (Jha et al,, 2006; Ford, McAlearney, Phillips, Menachemi, & Rudolph, 2008; Jha et al,, 2009; Jha, DesRoches, Kralovec, & Joshi, 2010). The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 includes billions of dollars in incentives to promote the adoption and meaningful use (MU) of certified EHRs among eligible hospitals (Blumenthal & Tavenner, 2010; Office of the National Coordinator, 2010). The HITECH Act's primary initiative provides incentive payments through Medicare and Medicaid to move hospitals to EHR adoption and MU by helping them overcome financial barriers (Ash & Bates, 2005; Thakkar & Davis, 2006; Jha et al,, 2009), but the ultimate goal is to achieve national improvements in quality and reductions in cost (Blumenthal & Tavenner, 2010).

In December 2012, the Centers for Medicare & Medicaid Services (CMS) completed the second year of incentive payments and released information on hospitals that successfully achieved MU. A 2010 survey found that 46% of hospitals expressed interest in participating in the program in 2011, the first opportunity to do so (Diana, Kazley, Ford, & Menachemi, 2012). However, a smaller percentage of hospitals actually achieved MU by the end of 2012 (CMS, 2012). It is important to understand the characteristics of hospitals that have successfully participated in the incentive program so that policy makers can get an early glimpse of how it is influencing EHR adoption and MU. Of particular interest is the extent to which previous EHR adoption is associated with achieving MU. Understanding this relationship will help determine if the program has merely rewarded hospitals that already had an EHR before the start of the program or encouraged hospitals to adopt a comprehensive EHR that meets the criteria for MU. Further, given that hospital incentive payments through Medicare are tied to Medicare caseload volume, it is important to determine if high-volume Medicare facilities are disproportionately represented among hospitals receiving payment as of 2012. Understanding these dynamics can help decision makers gauge the early impact of the HITECH Act's EHR incentive program and make any necessary corrections in the remaining years of the program.

The purpose of this article is threefold. First, we aim to characterize the hospitals that have achieved MU and identify differences between those that have and their counterparts. Second, we seek to determine how the 2010 HER adoption level is related to achieving MU by 2012. Third, we discuss the implications that our findings might have for the overall success of the HITECH incentive program. We conducted the analysis using data from the 2011 American Hospital Association's (AHA) Annual Survey of Hospitals and its 2011 release of the Hospital

EHR Adoption Database, the U.S. Department of Health and Human Services Health Resources and Services Administration's Area Resource File, and the CMS report of hospitals receiving incentive payments as of December 2012 (CMS, 2012).

Methods

We linked each data source using AHA and CMS identification numbers and restricted our analysis to hospitals potentially eligible to receive MU payments (i.e., nonfederal acute care hospitals in the 50 U.S. states). Data on hospital characteristics came from the AHA Annual Survey and included hospital size (measured as staffed beds), ownership (for-profit or not-for-profit), region of the country (by census division), teaching status (whether or not the organization is a member of the Council of Teaching Hospitals and Health Systems), system membership (part of a system or independent), and Joint Commission accreditation status. In addition, we obtained information from the AHA Annual Survey on (1) whether the hospital is eligible for Medicaid incentive payments (measured as having 10% or larger share of Medicaid discharges) and (2) the proportion of hospital inpatient days billed to Medicare (Medicare caseload). Last, we calculated market concentration at the hospital system level using the Herfindahl-Hirschman Index.

We calculated EHR adoption status in 2010 (prior to the start of the program) using the Annual Survey and EHR Adoption Database. We consider both data sources in our analyses because the latter source, as shown later, has a high nonresponse rate to this question. Using both data sources of EHR adoption serves as a sensitivity test to our analyses. Using the Annual Survey, we categorized EHR adoption into nonadopters, partial adopters, full adopters, and missing. We used the EHR Adoption Database to categorize EHR adoption into five categories: none, basic, basic with clinical notes, comprehensive, and missing (Jha et ah, 2009). Moreover, given that previous research suggests the hospital health information technology (IT) management strategy (e.g., best of breed, single vendor) may influence MU attainment (Ford, Menachemi, Huerta, & Yu, 2010), we extracted a variable from the EHR Adoption Database that indicates whether the hospital has a single EHR vendor. Last, from the Area Resource File, we extracted measures of rural and urban location and census division.

We conducted a bivariate analysis of these characteristics using chi-square tests of independence to compare the frequencies of each characteristic between hospitals that did and did not receive Medicare MU incentive payments and hospitals that did and did not respond to the EHR Adoption Database survey. Next, we conducted two separate logistic regressions to assess the relationship between these hospital characteristics and the receipt of Medicare MU incentive payments. One regression model used the Annual Survey EHR variable, and the other used the EHR Adoption Database EHR variable. The dependent variable for both logistic regressions is whether the hospital received Medicare MU incentive payments as of December 2012. We report both odds ratios and marginal effects (Greene, 2000) to assist with interpretation of the results.

Results

The final sample consisted of 4,683 nonfederal acute care hospitals, with 1,769 (38%) of these having received Medicare MU incentive payments as of December 2012. Of the hospitals in our sample, 2,877 (61%) provided information on their EHR status in the Annual Survey and 2,959 (63%) provided information on their EHR status in the EHR Adoption Database.

Table 1 presents the characteristics of the 4,683 hospitals that did and did not receive Medicare MU incentive payments. Hospitals that received payments differed significandy on all characteristics except for-profit status and system membership. Hospitals receiving incentive payments were more likely to be urban, larger, Joint Commission-accredited teaching hospitals with a single health IT vendor that were full or comprehensive HER adopters in 2010. Hospitals without an EHR in 2010 were significantly less likely to receive MU payments. Hospital Medicare share of inpatient days was positively associated with receiving MU payments for those hospitals in the upper third quartile. In bivariate analyses, hospitals located in the Mountain and Pacific census divisions were less likely to have received MU payments, and hospitals in the East North Central, New England, and South Atlantic census divisions were more likely to have received payments.

Table 1. Organizational Characteristics of Hospitals by MUA chievement (N= 4,683)

	Hospitals receiving MU payments (W = 1,769)	Potentially eligible hospitals that did not receive MU payments (N= 2,914)	*p-Value*
Location			
Rural	656 (34.7%)	1,233 (65.3%)	<.001
Urban	1,113 (39.8%)	1,681 (60.2%)	
Bed size			
1-125	844 (31.3%)	1,855 (68.7%)	<.001
126-399	689 (44.9%)	845 (55.1%)	
400+	236 (52.4%)	214 (47.6%)	
For-profit hospital			
No	1,433 (37.5%)	2,390 (62.5%)	.386
Yes	336 (39.1%)	524 (60.9%)	
Teaching hospital			
No	1,622 (36.8%)	2,786 (63.2%)	<.001
Yes	147 (53.5%)	128 (46.5%)	
System hospital			
No	769 (37.8%)	1,266 (62.2%)	.986
Yes	1,000 (37.8%)	1,648 (62.2%)	
Joint Commission accredited			
No	475 (29.5%)	1,134 (70.5%)	<.001
Yes	1,294 (42.1%)	1,780 (57.9%)	
2010 EHR status[a]			
None	842 (36%)	1,497 (64%)	<.001

Basic	62 (53.5%)	54 (46.5%)	
Basic with notes	203 (51.4%)	192 (48.6%)	
Comprehensive	76 (69.7%)	33 (30.3%)	
Missing	586 (34%)	1,138 (66%)	
2010 EHR status[b]			
No	8 (34.8%)	15 (65.2%)	<.001
Partial	807 (39%)	1,261 (61%)	
Full	450 (57.3%)	336 (42.7%)	
Missing	504 (27.9%)	1,302 (72.1%)	
Medicaid eligible			
No	381 (32.7%)	786 (67.3%)	<.001
Yes	1,388 (39.5%)	2,128 (60.5%)	
Single vendor			
No	945 (32.8%)	1,938 (67.2%)	<.001
Yes	824 (45.8%)	976 (54.2%)	
Medicare share			
1st quartile	299 (35.6%)	591 (66.4%)	.01
2nd quartile	545 (39.2%)	845 (60.8%)	
3rd quartile	557 (41.1%)	799 (58.9%)	
4th quartile	368 (35.2%)	679 (64.8%)	
Census divisions			
East North Central	321 (45.2%)	389 (54.8%)	<.001
East South Central	143 (35.7%)	258 (64.3%)	
Middle Atlantic	217 (55.4%)	175 (44.6%)	
Mountain	69 (18.5%)	305 (81.5%)	
New England	76 (41.5%)	107 (58.5%)	
Pacific	65 (12.5%)	455 (87.5%)	
South Atlantic	352 (51.5%)	331 (48.5%)	
West North Central	264 (39.4%)	406 (60.6%)	
West South Central	262 (37.3%)	440 (62.7%)	

Source. Authors' analysis. [a]Calculated using four categories developed by Jha et al. (2009). Calculated directly from responses to the AHA Annual Survey of Hospitals.

Table 2 breaks down the characteristics of hospitals that did and did not respond to the AHA Annual Survey Information Technology Supplement. Overall, 2,959 (63%) hospitals responded to the supplement. Responders differed from nonresponders on all characteristics except for location, Joint Commission accreditation, and Medicaid incentive eligibility. Responders were more likely to be larger, not-for-profit, teaching, system-member hospitals; be EHR adopters of any level in 2010; and have a single health IT vendor. Hospital Medicare share of inpatient days was also positively associated with responding. In bivariate analyses, hospitals in the East North

Central, Middle Atlantic, New England, South Atlantic, and West North Central census divisions were more likely to have responded.

Table 3 shows the results from the two logistic regressions. The first regression included the EHR status reported in the EHR Adoption Database using four categories of adoption. After controlling for all variables in the model, hospitals that had an EHR of any status (i.e., basic, basic with notes, or comprehensive) in 2010 were significantly more likely to have received an MU payment than those that had no EHR.

This effect was greatest for those hospitals that had a comprehensive HER in 2010 (OR [odds ratio] = 3.71; marginal effect = +27.7; $p < .01$). In addition, hospitals with 126 to 399 beds (OR = 1.69; marginal effect = 11.1; $p < .01$) and those with 400+ beds (OR = 2.20; marginal effect = 16.9; $p < .01$) achieved MU at higher rates than their smaller hospital counterparts. For-profit hospitals (OR = 1.56; marginal effect = 7.4; $p < .01$), Joint Commission accredited hospitals (OR = 1.38; marginal effect = 6.6; $p < .01$), those with a single EHR vendor (OR = 1.77; marginal effect = 11.8; $p < .01$), and those eligible for Medicaid incentives (OR = 1.24; marginal effect = 4.4, $p < .01$) were more likely than their counterparts to receive Medicare MU incentive payments.

Table 2. Organizational Characteristics of AHA EHR Supplement Responders and Nonresponders ($N = 4,683$)

	Hospitals not responding to the EHR Supplement (N= 1,724)	Hospitals responding to the EHR Supplement (N= 2,959)	p-Value
Location	685 (36.3%)	1,204 (63.7%)	.52
Rural	1,039 (37.2%)	1,755 (62.8%)	
Urban	1,039 (37.2%)	1,755 (62.8%)	
Bed size			
1-125	1,100 (40.8%)	1,599 (59.2%)	<.001
126-399	522 (34%)	1,012 (66%)	
400+	102 (22.7%)	348 (77.3%)	
For-profit hospital			
No	1,230 (32.2%)	2,593 (67.8%)	<.001
Yes	494 (57.4%)	366 (42.6%)	
Teaching hospital			
No	1,672 (37.9%)	2,736 (62.1%)	<.001
Yes	52 (18.9%)	223 (81.1%)	
System hospital			
No	670 (32.9%)	1,365 (67.1%)	<.001
Yes	1,054 (39.8%)	1,594 (60.2%)	
Joint Commission accredited			
No	597 (37.1%)	1,012 (62.9%)	.766

Yes	1,127 (36.7%)	1,947 (63.3%)		
2010 EHR status[a]				
No	0 (0%)	23 (100%)	<.001	
Partial	565 (27.3%)	1,503 (72.7%)		
Full	201 (25.6%)	585 (74.4%)		
Missing	958 (53.1%)	848 (46.9%)		
Medicaid eligible				
No	442 (37.9%)	725 (62.1%)	.386	
Yes	1,282 (36.5%)	2,234 (63.5%)		
Single vendor				
No	1,724 (59.8%)	1,159 (40.2%)	<.001	
Yes	0 (0%)	1,800 (100%)		
Medicare share				
1st quartile	293 (32.9%)	597 (67.1%)	<.001	
2nd quartile	566 (40.7%)	824 (59.3%)		
3rd quartile	466 (34.4%)	890 (65.6%)		
4th quartile	399 (38.1%)	648 (61.9%)		
Census divisions				
East North Central	216 (30.4%)	494 (69.6%)	<.001	
East South Central	195 (48.6%)	206 (51.4%)		
Middle Atlantic	109 (27.8%)	283 (72.2%)		
Mountain	170 (45.5%)	204 (54.5%)		
New England	39 (21.3%)	144 (78.7%)		
Pacific	241 (46.4%)	279 (53.6%)		
South Atlantic	274 (40.1%)	409 (59.9%)		
West North Central	140 (20.9%)	530 (79.1%)		
West South Central	303 (43.2%)	399 (56.9%)		

Source. Authors' analysis. Calculated directly from responses to the AHA Annual Survey of Hospitals.

Table 3. Relationship Between Hospital Characteristics and Receipt of Medicare EHR Incentive Payments

Hospital characteristics		Unadjuste d % of hospitals receiving MU payments (N= 4 ,683)		Receiving MU payments with AHA EHR status (N= 4,635)	
		OR (95 % Cl)	Marginal effect	OR (95 % Cl)	Marginal effect
2010 EHR status[a]					
None	36.0	1.00			
Basic	53.5	1.68 (1.13, 2.49)***	10.7		
Basic with notes	51.4	1.83 (1.45, 2.32)***	12.6		

Comprehensive	69.7	3.71 (2.37, 5.82)***	27.7		
Missing	34.0	1.53 (1.29, 1.83)***	8.8		
2010 EHR status[b]					
No	34.8		1.00		
Partial	39		1.17 (0.48, 2.86)	3.3	
Full	57.3		2.44 (0.99,6.00)*	19.3	
Missing	27.9		0.85 (0.35, 2.08)	-3.2	
Bed size					
1-125	31.3	1.00		1.00	
126-399	44.9	1.69 (1.43, 2.01)***	11.1	1.49 (1.26, 1.77)***	8.4
400+	52.4	2.20 (1.65, 2.93)***	16.9	1.79 (1.34, 2.39)***	12.3
Medicare share					
1st quartile	35.6	1.00		1.00	
2nd quartile	39.2	1.23 (1.01, 1.50)**	4.2	1.29 (1.06, 1.57)**	5.2
3rd quartile	41.1	1.28 (1.05, 1.56)**	5.1	1.22 (1.00, 1.49)**	4.1
4th quartile	35.2	1.10 (0.89, 1.36)	2.0	1.03 (0.83, 1.28)	0.6
For-profit tax status	39.1	1.56 (1.30, 1.87)***	9.2	1.86 (1.54, 2.25)***	12.7
Urban location	39.8	0.90 (0.76, 1.01)	-2.1	0.89 (0.73, 1.04)	-2.9
Competition (HHI)	—	1.24 (0.96, 1.61)	4.5	1.16 (0.89, 1.51)	3.0
Teaching hospital	53.5	1.01 (0.73, 1.38)	0.1	1.01 (0.74, 1.39)	0.3
System member	37.8	0.77 (0.67, 0.88)***	-5.5	0.73 (0.63, 0.84)***	-6.5

Medicaid incentive eligible	39.5	1.24 (1.05, 1.46)***	4.4	1.25 (1.06, 1.47)***	4.5
Joint Commission accredited	42.1	1.38 (1.17, 1.62)***	6.6	1.30 (1.10, 1.53)***	5.3
Single health IT vendor	45.8	1.77 (1.50, 2.10)***	11.8	1.43 (1.25, 1.64)***	7.3
Census division					
New England	41.5	1.00		1.00	
Middle Atlantic	55.4	1.65 (1.14, 2.40)***	11.6	1.81 (1.24, 2.63)***	13.5
East North Central	45.2	1.27 (0.90, 1.80)	5.4	1.27 (0.90, 1.80)	5.4
West North Central	39.4	1.27 (0.88, 1.82)	5.4	1.22 (0.85, 1.76)	4.5
South Atlantic	51.5	1.37 (0.96, 1.95)*	7.1	1.48 (1.03, 2.12)**	8.8
East South Central	35.7	0.80 (0.55, 1.18)	-4.8	0.92 (0.62, 1.35)	-1.9
West South Central	37.3	1.01 (0.71, 1.44)	0.2	0.97	(0.68, 1.39)
Mountain	18.5	0.35 (0.23,0.54)***	-19.7	0.38 (0.25, 0.58)***	-18.2
Pacific	12.5	0.20	(0.13, 0.30)***	-26.9	0.22 (0.15, 0.34)***

Source. Authors' analysis. Note. HHI = Herfindahl-Hirschman Index. [a]Calculated using four categories developed by Jha et al. (2009). bCalculated directly from responses to the AHA Annual Survey of Hospitals. *$p <$. 10. **$p < .05$. ***$p < .01$.

On the other hand, hospitals that were part of a system (OR = 0.77; marginal effect = -5.5; $p <$ .01) and those located in the Mountain (OR = 0.35; marginal effect = -19.7; $p < .01$) and Pacific (OR = 0.20; marginal effect = -26.9; $p < .01$) regions were significantly less likely to have received Medicare MU incentive payments relative to hospitals in the New England region. Hospitals in the Middle Atlantic (OR = 1.65; marginal effect = 11.6; $p < .01$) and South Atlantic (OR = 1.37; marginal effect = 7.1; $p < .10$) regions were significantly more likely to have received Medicare MU incentive payments relative to hospitals in the New England region.

Finally, hospitals with a Medicare share in the second (OR = 1.23; marginal effect = 4.2; $p < .05$) and third (OR = 1.28; marginal effect = 5.1; $p < .05$) quartiles were associated with a significantly higher likelihood of achieving MU relative to hospitals in the first quartile.

The second logistic regression used the Annual Survey of Hospitals EHR variable instead of the EHR variable developed from the EHR Adoption Database. We conducted this regression as a sensitivity analysis because of the level of nonresponse to the EHR Adoption Database survey. The results are similar, with full EHR adoption significantly related to the receipt of Medicare MU incentive payments (OR = 2.44; marginal effect = 19.3; $p < .10$). Hospitals with 126 to 399 beds (OR = 1.49; marginal effect = 8.4; $p < .01$) and those with 400+ beds (OR = 1.79; marginal effect = 12.3; $p < .01$) achieved MU at higher rates than their smaller hospital counterparts. For-profit hospitals (OR = 1.86; marginal effect = 12.7; $p < .01$), Joint Commission-accredited hospitals (OR = 1.30; marginal effect = 5.3; $p < .01$), those with a single EHR vendor *(OR = 1.43; marginal effect = 7.3; $p < .01$)*, and those eligible for Medicaid incentives *(OR = 1.25; marginal effect = 4.5, $p < .01$)* were more likely than their counterparts to receive Medicare MU incentive payments.

On the other hand, hospitals that were part of a system *(OR = 0.73; marginal effect = -6.5; $p < .01$)* and those located in the Mountain *(OR = 0.38; marginal effect = -18.2; $p < .01$)* and Pacific *(OR = 0.22; marginal effect = -25.3; $p < .01$)* regions were significantly less likely to have received Medicare MU incentive payments relative to hospitals in the New England region. Hospitals in the Middle Atlantic *(OR = 1.81; marginal effect = 13.5; $p < .01$)* and South Atlantic *(OR = 1.48; marginal effect = 8.8; $p < 0.05$)* regions were significantly more likely to have received Medicare MU incentive payments relative to hospitals in the New England region.

Discussion

The main finding from our analysis is that adoption of an EHR system prior to the start of the incentive program was the strongest predictor of achieving MU among the approximately 38% of eligible hospitals that had achieved MU as of December 2012. Thus, the EHR incentive program seems to have disproportionately rewarded hospitals that had already been engaging in the desired behavior. At this early stage of the MU program, this finding raises the concern that the EHR incentive program may not rapidly achieve the intended goal of widespread EHR MU, which, because of low national EHR adoption rates, must be driven by new HER implementations (Jha et al., 2009; Blumenthal, 2010).

Additionally, although more than two thirds of hospitals with a comprehensive EHR in 2010 earned an MU payment through 2012 and the definition of *comprehensive EHR* was aligned to the EHR MU criteria, 30% of organizations with the IT infrastructure in place to meet the MU criteria failed to attest to their eligibility for Medicare incentive payments. Although our analysis cannot determine why the facilities with advanced EHR systems did not participate in the MU program, previous research has found that hospitals that failed to achieve MU in 2011 were more

likely to report challenges with meeting the computerized provider order entry (CPOE) MU objective (Harle, Huerta, Ford, Diana, & Menachemi, 2012). These issues may stem from the social, organizational, and technological challenges of implementing CPOE that can lead to implementation failures and lack of consistent use by physicians. Further, assuming that hospital management performs marginal analyses before adopting new technology, we would expect the MU incentives to increase marginal revenue for those hospitals closest to achieving comprehensive EHR status and MU. It may be that additional time is needed before EHR adoption can be accelerated in response to the HITECH Act incentives.

On the other hand, the goals of reducing Medicare costs by providing greater incentives to high-volume Medicare hospitals may be having the desired impact. We found evidence that, after controlling for other factors, an increase in Medicare share was positively associated with achieving MU. If the financial and quality benefits of widespread EHR adoption are eventually realized, Medicare may see a disproportionately high percentage of these returns, thereby justifying the policy.

Other hospital characteristics were associated with achieving MU, including the fact that for-profit hospitals achieved higher rates of MU than their counterparts. To the extent that for-profit hospitals scrutinize major decisions for their returns on investment, the MU payments may have been seen as a unique opportunity to pursue an EHR. Alternatively, for-profit hospitals may be more efficient in pursuing opportunities that maximize reimbursement. Our findings also indicate that hospitals with greater resources, including larger or accredited facilities, were more likely to have received incentive payments. This result may reflect the ability of hospitals with more resources to leverage both the financial and nonfinancial resources needed to achieve MU.

System membership was negatively associated with receiving MU payments, which seems contrary to the argument that resource availability increases the likelihood of achieving MU. This finding suggests either that system hospitals were less nimble in reacting to the opportunity or that they made a strategic choice to "wait and see." In addition, because of their centralized governance structure, some system affiliated hospitals may have a tendency to take longer to act on major initiatives. Future research should examine what, if any, barriers to achieving MU were unique to system-affiliated hospitals.

Beyond these hospital characteristics, we found that hospital health information management strategies were associated with receiving MU payments. Hospitals pursuing an enterprise resource planning approach that uses a single vendor for all applications may have had an advantage in achieving MU. This advantage may stem from the lack of need to integrate cross-platform information systems, which may be costly and time consuming for hospitals managing products from multiple vendors. We expect this trend to become less pronounced in subsequent years as more hospitals with different health IT management strategies achieve MU. However, to the extent that these management strategies are related to other hospital characteristics, such as size or financial performance, more persistent differences may exist between hospitals with the

resources to implement an enterprise-wide approach to managing their health information systems portfolio and those without such resources. This finding may also indicate that efforts to integrate different systems within organizations are not sufficiently successful to allow MU achievement.

Finally, we found a significant regional effect related to achieving MU. Hospitals outside of the New England and Middle Atlantic regions were generally less likely to have received incentive payments. Hospitals in the Mountain and Pacific divisions were particularly far behind. This trend may reflect the historical commitment to EHR among hospital leaders in the New England region (Chaudhry et al,, 2006).

Our study has some notable limitations. First, we employed a cross-sectional design, which limits us to examining associations rather than causation. Second, we could not match all hospitals appearing on the CMS list of MU achievers to AHA data used in our analysis (we matched 1,769 of 2,123 hospitals on the CMS list). Third, our study focuses on the first two years of the incentive program and therefore does not offer conclusive evidence regarding the ultimate impact of the HITECH Act. Nevertheless, our data provide an early glimpse of what factors may be influencing MU achievement, thereby allowing for action by CMS to ensure the success of the program in the remaining years.

Conclusion

Without changes in the trends we identified, the policy goal of promoting EHR adoption and MU may not be fully realized in the near future. Our findings provide some guidance for policy makers on what adjustments to make to the MU program before the Stage 2 MU requirements are implemented. For example, policy makers could modify the incentive payments based on how far hospitals are from achieving MU, so that those that have not adopted an EHR could potentially receive higher incentives than those that already have an EHR or have begun EHR adoption. They could also focus on hospitals in the Mountain and Pacific regions of the country, perhaps considering level of incentive in conjunction with their HER status. Smaller hospitals could receive higher incentive payments to further motivate EHR adoption and provide additional financial resources to do so. In addition to these strategies, which provide targeted financial incentives, policy makers could increase regional extension centers' focus on hospitals to help nonadopting hospitals overcome organizational, cultural, technological, and other nonfinancial barriers to achieving MU. We recognize that the political challenges of implementing some of these recommendations may be significant. For example, explicit favoring of late adopters would seem to penalize early adopters by reducing the return on their technology investments, as would providing greater incentives to hospitals in certain regions of the country. However, such strategies may be necessary to avoid the continuation of historically persistent differences among smaller rural hospitals and their larger urban counterparts into the arena of meaningful use of health information technologies.

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