

Accountable Care Organization Hospitals Differ in Health IT Capabilities

Daniel M. Walker, PhD, MPH; Arthur M. Mora, PhD, MHA; and Ann Scheck McAlearney, ScD, MS

The passage of the Affordable Care Act in 2010 authorized CMS to disburse incentive payments to accountable care organizations (ACOs) comprised of providers who voluntarily agree to care for Medicare fee-for-service beneficiaries.¹ CMS developed 2 ACO program types—the Shared Savings Program and the Pioneer Program—which financially reward ACO-participating providers that surpass quality and cost benchmarks established for predefined populations based on the level of risk assumption.^{2,3} The ACO model has grown in popularity and has been extended to both private-sector payers and Medicaid.^{4,5} This expansion has resulted in over 700 ACOs covering nearly 24 million lives, demonstrating modest results in controlling costs and improving quality as shown in early analyses.⁶⁻¹⁰

Concurrent with the growth of ACOs, the Meaningful Use (MU) policy program that provides financial incentives for eligible hospitals and providers to adopt and use health information technology (IT), and penalizes nonadoption and non-use, has been credited with the rapid growth in the adoption and use of health IT.^{11,12} The phased integration of this program has largely dictated the specific health IT components that providers have adopted. In recognition of both success and challenges with the program, CMS recently announced that the MU program for eligible providers will transition to become part of the newly implemented Merit-based Incentive Program System (MIPS) that aims to formally align MU with quality improvement and payment reform initiatives.¹³ However, the MU program for hospitals will continue, as is, for the foreseeable future, despite changes being anticipated.¹⁴

Although ACO incentives are not directly tied to health IT adoption, many experts believe that providers participating in ACOs must possess robust health IT to support care coordination mechanisms necessary to reach cost and quality goals.¹⁵⁻²⁰ To better understand how ACOs are using and developing health IT, Wu et al conducted a mixed-methods study and found wide variation in ACO health IT capabilities.¹⁹ Other recent work highlights the role that health IT can play in helping to facilitate care coordination by assisting with decision support.^{20,21} Moreover, health IT can be linked across

ABSTRACT

OBJECTIVES: The aim of this study was to evaluate health information technology (IT) adoption in hospitals participating in accountable care organizations (ACOs) and compare this adoption to non-ACO hospitals.

STUDY DESIGN: A cross-sectional sample of US nonfederal, acute care hospitals with data from 3 matched sources: the 2013 American Hospital Association (AHA) Annual Survey, the 2013 AHA Survey of Care Systems and Payments (CSP), and the 2014 AHA Information Technology Supplement.

METHODS: To compare health IT adoption in ACO- and non-ACO hospitals, we created measures of Meaningful Use (MU) Stage 1 and Stage 2 core and menu criteria, patient engagement-oriented health IT, and health information exchange (HIE) participation. Adoption was compared using both naive and multivariate logit models.

RESULTS: Of the 393 ACO hospitals and 810 non-ACO hospitals, a greater percentage of ACO hospitals were capable of meeting MU Stage 1 (50.9% vs 41.6%; $P < .01$) and Stage 2 (7.6% vs 4.8%; $P < .05$), having patient engagement health IT (39.8% vs 15.2%; $P < .001$), and participating in HIE (49.0% vs 30.1%; $P < .001$). In adjusted models, no difference was found between ACO and non-ACO hospital ability to meet MU Stage 1 or Stage 2, but ACO hospitals were more likely to have patient engagement health IT (odds ratio [OR], 2.20; 95% CI, 1.59-3.04) and be HIE participants (OR, 1.41; 95% CI, 1.03-1.92).

CONCLUSIONS: ACO-participating hospitals appear to be focused more on adopting health IT that aligns with broader strategic goals rather than those that achieve MU. Aligning adoption with quality and payment reform may be a productive path forward to encourage hospital health IT adoption behavior.

Am J Manag Care. 2016;22(12):802-807

organizational boundaries through interoperable platforms, including health information exchanges (HIEs).²⁰ This exchange of information offers providers access to comprehensive health information at the point of care. Importantly, HIEs also can help facilitate population-level health assessments—critical for ACOs that are responsible for the care of a defined patient population.^{2,22,23} ACOs may also offer patient portals and other patient-facing health IT components to improve patient engagement and better involve patients in the care process, working toward the goal of reducing costs and improving quality.^{24,25}

In the context of these 2 significant policy initiatives—ACOs and MU—the extent to which ACO health IT strategies and MU criteria are aligned in the marketplace remains unknown. Additionally, questions remain regarding the specific health IT elements ACO provider organizations possess that address care coordination challenges relative to non-ACO providers. This study aims to: 1) characterize the health IT capabilities of ACO provider organizations, and 2) compare these organizations with non-ACO participants in an effort to understand how health IT capacity differs between the 2 in regards to MU achievement, patient engagement, and HIE. These findings can contribute to the ongoing discussions around how to align alternative payment models that support quality improvements with MU policy.

METHODS

This study used a cross-sectional design with data from 3 matched sources covering the same sampling frame: the 2013 American Hospital Association (AHA) Annual Survey (organizational and service characteristics), the 2013 AHA Survey of Care Systems and Payment (CSP) (ACO participation), and the 2014 AHA Information Technology (IT) Supplement (health IT adoption and use). The 2014 AHA IT Supplement is administered to respondents of the 2013 AHA Annual Survey, and represents hospital IT capabilities as of fall 2013. The 2013 CSP Survey, fielded in early 2013 to respondents of the 2012 AHA Annual Survey, and is used to determine hospital ACO participation status. Although the CSP Survey precedes the IT Supplement Survey, the lengthy contracts and significant amount of resources required to develop an ACO make it unlikely that these hospitals would change their ACO participation status within the timeframe between the CSP and IT surveys. Only nonfederal, acute care general hospitals within the United States were included in the analytic sample.

ACO Participation

ACO participation was determined from the CSP Survey question asking hospitals if their “Hospital established a separate legal entity for an accountable care organization (ACO) with the goal of being

TAKE-AWAY POINTS

- ▶ Accountable care organization (ACO) hospitals appear to be aligning their health information technology (IT) adoption with strategic goals of quality improvement and cost reduction.
- ▶ ACO incentives may outweigh Meaningful Use (MU) incentives, pushing hospitals to adopt different technologies, such as patient engagement- and exchange-oriented health IT.
- ▶ Hospitals may consider adopting technologies that align with their strategic goals to engage patients, improve quality of care, and reduce costs.
- ▶ Policy makers may consider aligning MU with quality improvement and alternative payment models for hospitals, as has been done for eligible providers.

able to accept contracts to provide healthcare for a defined population?” Responses of, “Yes, my hospital has established an ACO” and “Yes, my hospital is part of an ACO” were combined into an ACO participant category (“ACO hospital”) and all other hospitals were categorized as nonparticipants (“non-ACO hospital”). The survey did not distinguish among Medicare, private sector, or Medicaid ACOs.

Health IT Capabilities

Following previous work, we mapped survey items from the IT Supplement to each of the 16 MU Stage 1 and 2 core measures (**eAppendix** [eAppendices available at www.ajmc.com]),^{11,26} allowing for the assessment of each MU item and aggregate measures of MU Stage 1 and 2. We additionally mapped survey items to the 6 menu items in MU Stage 2 (**eAppendix Table A**). We also evaluated hospital health IT activity in 2 different domains particularly relevant to ACO development: patient engagement and health information exchange (HIE).

Two MU Stage 2 core criteria are relevant to patient engagement: the ability for patients to view, download, and transmit their health record; and electronic access to patient-specific education. However, the AHA IT supplement contains 5 additional items concerning health IT and patient interaction: request change to health record online, schedule an appointment online, submit patient-generated data, request a prescription refill, and secure messaging. These patient-facing components are particularly relevant for ACOs that rely on patient retention.²⁴ The responses for the 7 components (2 MU Stage 2 criteria and 5 patient interaction questions) were summed to calculate an aggregate measure of patient engagement health IT capability. Hospitals utilizing greater than half of patient engagement components (≥ 4 components) were considered to possess patient engagement-oriented health IT. We conducted sensitivity analysis around this cut-off to ensure that this number of patient engagement health IT components was not too restrictive. We found a sharp drop in the number of hospitals with at least 2 or more capabilities, but found relative stability between 2 and 6 capabilities; only a small percentage of hospitals had all 7 capabilities (see **eAppendix Table B**). Thus, we decided that the threshold (≥ 4 components) was appropriate.

Given that the ACO model requires hospitals to exchange health information with providers potentially outside of their organiza-

TABLE 1. Inverse Probability Weighted Characteristics of ACO and Non-ACO Hospitals

	ACO Hospital (n = 393) (%)	Non-ACO Hospital (n = 810) (%)	P
Bed size			<.001
Small (<99)	34.5	57.4	
Medium (100-399)	48.4	35.8	
Large (≥400)	17.1	6.8	
Ownership			<.001
Government, nonfederal	10.7	28.8	
Nonprofit	77.6	51.4	
For-profit	12.3	19.7	
Teaching status	10.4	3.2	<.001
System member	77.9	50.3	<.001
Region			<.001
Northeast	19.8	8.2	
Midwest	31.7	28.6	
South	31.5	42.0	
West	16.9	21.3	
Urban	89.1	65.5	<.001

ACO indicates accountable care organization.

tion, it remains relevant to assess exchange capacity beyond the ability to transmit clinical care documents, required as one of the MU Stage 2 core criteria. Therefore, hospitals that noted they are “participating and actively exchanging data in at least 1 HIE/RHIO [regional health information organization]” in response to the AHA IT Survey question asking hospitals to “Please indicate your level of participation in a regional health information exchange (HIE) or regional health information organization (RHIO),” were included.

Analysis

Previous work has identified differences between respondents and nonrespondents of both the AHA IT Supplement and the CSP Survey compared with the AHA Annual Survey.¹⁷ To reduce this response bias, we applied an inverse probability weighting approach that regresses hospital characteristics (bed size, ownership type, system status, teaching status, region, urban/rural location) on whether the hospital responded to all 3 surveys.^{27,28} Predicted probabilities yielded from this model are applied as weights in all analyses.

Using the weighting approach, we compared the aforementioned hospital characteristics of ACO hospitals and non-ACO hospitals using χ^2 tests. Next, we used χ^2 tests to compare naïve adoption rates between ACO and non-ACO hospitals of the aggregate MU Stage 1 and Stage 2 measures, each core component, the menu items, the additional patient engagement and exchange indicators, and the

aggregate patient engagement measure. We additionally evaluated separate multivariate logistic regression models to assess the effect of ACO participation on 3 indicators of health IT adoption: the ability to meet MU Stage 2 (core measures only), patient engagement health IT, and HIE participation. We chose to evaluate the stricter MU Stage 2 set of criteria rather than Stage 1 due to its focus on use of health IT rather than adoption (eAppendix Table C). These models included the set of hospital-level control variables listed above.

RESULTS

Inverse probability weighted hospital characteristics are shown by hospital ACO participation status in Table 1. Overall, the analytic sample included 1203 US nonfederal acute care hospitals that responded to all 3 surveys. Of these hospitals, weighted results revealed that 32% (393) of these hospitals were ACO participants. ACO participants were more likely to be large, nonprofit, teaching, and system members, located in urban areas and in the northeast.

Weighted unadjusted comparisons of aggregate measures of health IT adoption and adoption of specific health IT components between ACO and non-ACO hospital participants are presented in Table 2. A greater proportion of ACO hospitals are capable of meeting MU Stage 1 and Stage 2, although only 7.6% of ACO hospitals and 4.8% of non-ACO hospitals could meet Stage 2. A greater proportion of ACO hospitals adopted 11 of the 16 core criteria, while no difference was found in the remaining 5 criteria. Similarly, a greater proportion of ACO hospitals had adopted 5 of the 6 menu items, and no difference was found with the sixth item. For the additional patient engagement activities, a greater proportion of ACO hospitals had adopted each of the 5 capabilities. Lastly, a greater proportion of ACO hospitals were participating in an HIE (49.0 vs 30.1; $P < .001$).

For the MU Stage 2 aggregate measures, the aggregate measure of patient engagement capability and HIE participation, we conducted multivariate analyses to determine the adjusted effect of ACO participation on health IT adoption (Table 3). Adjusted analyses revealed no difference between ACO and non-ACO hospital ability to meet MU Stage 2. Alternatively, ACO hospitals were more likely to be participating in an HIE than non-ACO hospitals (odds ratio [OR], 1.41; 95% CI, 1.03-1.92). Our aggregate measure of patient engagement capability included hospitals that had at least 4 of the 7 functions that involved patient activity. ACO hospitals were significantly more likely than non-ACO hospitals to achieve this level of patient engagement health IT adoption and possess robust patient-oriented health IT (OR, 2.20; 95% CI, 1.59-3.04).

DISCUSSION

In reporting 2014 results for the Shared Savings and Pioneer ACO programs, CMS stated that the programs had generated greater than \$411 million in total savings, while ACO provider organizations out-

paced quality benchmarks since program inception.²⁹ Among the measures demonstrating significant year-to-year improvement in that report was the percentage of ACO participating providers that qualified for an electronic health record (EHR) incentive payment (77% in 2013 increased to 81% in 2014). Despite this evidence that ACO providers continue to invest in health IT, little is known about the specific health IT capabilities of ACO providers and how they differ from non-ACO providers.

Our results suggest that, in a simple comparison, ACO hospitals are significantly more likely than non-ACO hospitals to be able to attest to MU Stage 1 and Stage 2. Interestingly, despite the percentage differences, we found no difference in ability to meet MU Stage 1 or 2 when accounting for hospital characteristics. Our findings of significant differences between ACO and non-ACO hospitals in HIE and patient engagement health IT in adjusted models suggest that ACO hospitals may be looking beyond incentives for health IT adoption to guide their investment choices, and these hospitals may be circumventing MU Stage 2 requirements to pursue a strategy of aligning health IT investments with ACO goals.

As an example of this alignment, consider the need for ACOs to conduct population health management. Health IT is a critical asset toward this strategy; it can enable tracking of patients across healthcare settings, as well as population-level analytics. The greater participation in an HIE by ACO hospitals, as seen in our study, may demonstrate ACO reliance on greater shared information for care management processes,²⁰ including limiting duplication of services, predicting inefficient utilization, and monitoring patient cost. However, these choices may result in intriguing dynamics in the HIE landscape. ACOs may be preferential to closed HIE networks, often called Enterprise HIEs, that limit participation and sharing of clinical data to providers within a network or health system, such as an ACO.²² The alternative HIE model, the community HIE, may offer greater potential in terms of public health benefits, yet the business case may be less clear for ACOs. Future research may focus on the competitive dynamics play-

TABLE 2. Comparison of ACO and Non-ACO Hospital Health IT Characteristics, Weighted

Health IT Capability	Non-ACO (n = 810) (%)	ACO (n = 393) (%)	P
Aggregate Measures			
Meet MU Stage 1	41.6	50.9	<.01**
Meet MU Stage 2	4.6	7.6	<.05*
MU Stage 2-Specific Measures			
Core measures			
CPOE for medication, laboratory and radiology orders	83.9	89.3	<.05*
Record demographic information	88.3	92.4	.070
Record and chart changes in vital signs	95.9	99.1	<.01**
Record smoking status	95.5	98.9	<.01**
Clinical decision support	68.0	81.4	<.001***
Patient ability to view, download, and transmit	7.9	15.5	<.001***
Security risk assessment	88.1	93.9	<.05*
List of patients by condition	88.4	93.7	<.05*
Patient-specific education	87.8	93.8	<.01**
Medication reconciliation	83.3	86.3	.268
Summary of care record for each transition	30.6	48.8	<.001***
Automatically track medications (eMAR)	91.6	97.6	<.001***
Incorporate lab results	90.9	96.1	<.05*
Submit electronic data to immunization registries	69.7	75.7	.08
Submit electronic Syndromic Surveillance data	61.7	64.2	.469
Submit electronic reportable lab results	61.7	65.9	.225
Menu items			
Advance directives	76.6	76.2	.89
Record electronic notes in patient record	43.0	54.5	<.001***
Electronic imaging result	65.8	82.8	<.001***
Record patient family history	81.9	90.3	<.001***
Electronic prescriptions	60.2	69.6	<.01**
Structured lab results to ambulatory providers	44.9	67.9	<.001***
Additional patient engagement capabilities			
Request change to record online	28.8	54.5	<.001***
Schedule appointment online	21.3	48.9	<.001***
Submit patient-generated data	8.3	20.9	<.001***
Request prescription refill	18.9	43.8	<.001***
Secure messaging ^a	25.0	44.1	<.001***
Patient engagement health IT ^b	15.2	39.8	<.001***
Health information exchange	30.1	49.0	<.001***

ACO indicates accountable care organization; CPOE, Computerized Physician Order Entry; eMAR, electronic medical administration record; IT, information technology; MU, Meaningful Use. ** indicates P <.05; *** indicates P <.01; **** indicates P <.001.

^aMU Stage 2 criteria for eligible providers.

^bAt least 4 of patient ability to view, download, and transmit record; patient specific education; request change to record online, schedule appointments online; submit patient generated data; request prescription refill; secure messaging.

TABLE 3. The Effect of ACO Participation and Organizational Factors on Health IT Adoption Among US Nonfederal Acute Care Hospitals

	MU Stage 2 OR (95% CI)	HIE OR (95% CI)	Patient Engagement ^a OR (95% CI)
ACO participant	1.47 (0.84-2.57)	1.41 (1.03-1.92)*	2.20 (1.59-3.04)***
Bed size			
Small (<99)	Ref	Ref	Ref
Medium (100-399)	0.98 (0.54-1.77)	1.23 (0.91-1.67)	1.18 (0.83-1.68)
Large (≥400)	0.83 (0.29-2.35)	1.45 (0.78-2.70)	0.80 (0.47-1.36)
Ownership			
Government, nonfederal	Ref	Ref	Ref
Nonprofit	1.39 (0.65-2.98)	1.73 (1.19-2.49)	2.01 (1.29-3.11)**
For-profit	0.28 (0.06-1.30)	0.19 (0.08-0.44)**	0.21 (0.07-0.59)**
Teaching status	1.60 (0.53-4.84)	1.11 (0.32-0.72)***	3.79 (2.17-6.62)***
System member	0.82 (0.47-1.46)	1.48 (1.05-2.09)*	2.24 (1.59-3.14)***
Region			
Northeast	Ref	Ref	Ref
Midwest	1.88 (0.95-3.74)	0.48 (0.32-0.72)***	2.05 (1.36-3.11)**
South	0.81 (0.33-2.01)	0.57 (0.36-0.89)*	1.09 (0.68-1.76)
West	0.57 (0.19-1.63)	0.55 (0.35-0.89)*	1.29 (0.76-2.19)
Urban	1.12 (0.45-2.78)	1.22 (0.83-1.80)	1.61 (0.97-2.66)

ACO indicates accountable care organization; IT, information technology; MU, Meaningful Use; Ref, reference.

** indicates $P < .05$; *** indicates $P < .01$; **** indicates $P < .001$.

^aAt least 4 of patient ability to view, download, and transmit record; patient specific education; request change to record online, schedule appointments online; submit patient generated data; request prescription refill; secure messaging.

ing out as a result of the relationship between ACO networks and interoperability initiatives.

Similarly, the growth of ACOs may be driving the push toward technology that empowers patients. Consumers demand the ease with which technology can facilitate access to their records and healthcare-related information. As a result, patient-facing technologies may be requisite for ACOs that need to retain patients that may not know they are part of an ACO.²⁴ Leadership at ACO hospitals may see investment in tools that facilitate better communication with patients as a key tactic to enhance quality, increase patient retention, reduce costs, and improve outcomes.²⁵ This indication of stronger patient orientation suggests that ACO hospitals have chosen to pursue a technology strategy that closely aligns with ACO metrics. Although investing in patient-facing health IT and population health tools may be a logical investment for ACO hospitals, non-ACO hospitals may only have the bandwidth to focus on incentives for MU adoption, as evidenced by similar results between ACO and non-ACO hospitals in our regression models.

Limitations

This study faces important limitations. First, the combination of the AHA IT Supplement and the CSP Survey limits our sample, and these

hospitals differ from the population of acute care hospitals in the United States. Although we do apply inverse probability weighting to address this bias, the bias cannot be eliminated. Second, our study is limited to a cross-sectional view of ACO and non-ACO hospital health IT status. The ACO model is rapidly spreading across the healthcare landscape, as is health IT adoption and use. Our use of cross-sectional data allows us to determine a baseline of health IT adoption and to better glimpse the way that ACO hospitals may be orienting their technological capability compared with non-ACO hospitals. However, the causal direction of this relationship remains unknown, and is a ripe area for future research.

CONCLUSIONS

Policy makers have recently taken steps to more tightly align policy aims and health IT adoption through programs such as the Alternative Payment Models and MIPS for eligible providers. Although this alignment does not yet exist for hospitals, our findings that ACO hospitals are already adopting and exchange-oriented health IT suggests that ACO incentives may be a better driver of care change than MU incentives. As a result, align-

ment of MU goals with the quality and cost goals of ACOs may be a productive policy path forward pertaining to hospitals. ■

Author Affiliations: Department of Family Medicine, College of Medicine, Ohio State University (DMW, ASM), Columbus, OH; Global Health Management and Policy, Tulane University School of Public Health and Tropical Medicine (AMM), New Orleans, LA.

Source of Funding: None.

Author Disclosures: The authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (AMM, DMW); acquisition of data (DMW); analysis and interpretation of data (AMM, ASM, DMW); drafting of the manuscript (AMM, ASM, DMW); critical revision of the manuscript for important intellectual content (AMM, ASM, DMW); statistical analysis (DMW).

Address Correspondence to: Daniel M. Walker, PhD, MPH, Department of Family Medicine College of Medicine, Ohio State University, 273 Northwood-High Building, 2231 North High St, Columbus, OH 43201. E-mail: Daniel.Walker@osumc.edu.

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eAppendix

Table A. Meaningful Use Stage 1 and Stage 2 core and menu items and their proxy measure from the 2014 AHA Information Technology Supplement.

Meaningful Use Criteria	MU Stage 1 AHA IT Supplement Questions	MU Stage 2 AHA IT Supplement Questions
<i>Core Items</i>		
Use CPOE for medication orders directly entered by any licensed healthcare professional who can enter order into the medical record per state, local, and professional guidelines	Computerized provider order entry for medication	Computerized Provider Order Entry for all of: 1) Laboratory Reports 2) Radiology Reports 3) Radiology Images
Implement drug-drug and drug-allergy interaction checks	Decision support for drug allergy alerts; decision support for drug-drug interactions	<i>No longer stand alone metric - Part of Clinical Decision Support Measure</i>
Record demographics: preferred language, gender, race, ethnicity, date of birth, and date and preliminary cause of death in the event of mortality in the eligible hospital or CAH	Electronic clinical documentation for each of the following: patient demographics, physician notes, nursing notes	Electronic clinical documentation for each of the following: Gender, Race, Ethnicity, Date of Birth, Preferred Language of Communication, date and preliminary cause of death
Maintain up-to-date problem list of current and active diagnoses	Electronic clinical documentation of Problem lists	<i>No longer stand alone metric – Part of Summary of Care Document at Transitions and Referrals</i>
Maintain active medication lists	Electronic clinical documentation of Medication lists	<i>No longer stand alone metric – Part of Summary of Care Document at Transitions and Referrals</i>
Maintain active medication allergy list	Record and maintain medication allergy lists	<i>No longer stand alone metric – Part of Summary of Care Document at Transitions and Referrals</i>
Record and chart vital signs: height, weight, blood pressure, calculate and display BMI, plot and display growth charts for children 2-20 years, including BMI	Electronic clinical documentation of Vital signs	Electronic clinical documentation of Vital signs, height, weight, and BMI
Record smoking status for patients 13 years old or older	Record smoking status using a standard format	Record smoking status using a standard format

Meaningful Use Criteria	MU Stage 1 AHA IT Supplement Questions	MU Stage 2 AHA IT Supplement Questions
Implement one clinical decision support rule and the ability to track compliance with the rule	(At least one of the following): clinical guidelines, clinical reminders, drug allergy alerts, drug-drug interaction alerts, drug-lab interaction alerts, drug dosing support	Implement at least 5 Clinical Decision Support interventions related to 4 or more clinical quality measures
Report clinical quality measures to CMS or the States	(At least one of the following): automatically generate hospital-specific meaningful use quality measures by extracting data from an electronic health record without additional manual processes; Automatically generate Medicare Inpatient Quality Reporting program measures for a full Medicare inpatient update; Automatically generate physician-specific meaningful use quality measures calculated directly from the EHR without additional manual processes	<i>No longer included as a Meaningful Use measure</i>
Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, medication allergies, discharge summary, procedures), upon request	Provide patients an electronic copy of their record within 3 business days	<i>No longer a stand alone metric – Part of providing patients with the ability to view/ download/ and transmit electronic record</i>
Provide patients with an electronic copy of their discharge instructions at time of discharge, upon request	Provide patients with an electronic copy of their discharge instructions upon request	<i>No longer a stand alone metric – Part of providing patients with the ability to view/ download/ and transmit electronic record</i>

Meaningful Use Criteria	MU Stage 1 AHA IT Supplement Questions	MU Stage 2 AHA IT Supplement Questions
Capability to exchange key clinical information (ex: problem list, medication list, medication allergies, diagnostic test results), among providers of care and patient authorized entities electronically	Electronically exchange key clinical information with providers	<i>No longer included as a Meaningful Use measure</i>
Protect electronic health information created or maintained by certified EHR technology through the implementation of appropriate technical capabilities	Conduct or review a security risk analysis and implement security updates as necessary	Conduct or review a security risk analysis and implement security updates as necessary
Provide patients the ability to view online, download, transmit information about a hospital admission	<i>Not a Meaningful Use measure</i>	Are patients treated in your hospital able to do the following: 1) View their health/medical record AND 2) Download information from their health/medical record AND 3) Electronically transmit (send) care/ referral summaries to a third party
Incorporate clinical lab test results into Certified EHR technology as structured data	<i>Not included in MU Stage 1 measure creation¹</i>	Incorporate as structured data lab results for more than 40 percent of patients admitted to inpatient or emergency departments
Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research, or outreach	<i>Not a Meaningful Use Stage 1 measure</i>	Generate list of patients by condition
Use clinically relevant information from Certified EHR technology to identify patient-specific education resources and provide those resources to the patient	<i>Not a Meaningful Use Stage 1 measure</i>	Identify and provide patient-specific education resources

Meaningful Use Criteria	MU Stage 1 AHA IT Supplement Questions	MU Stage 2 AHA IT Supplement Questions
The eligible hospital or CAH who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation	<i>Not a Meaningful Use Stage 1 measure</i>	Compare inpatient and preadmission medication lists AND Provide an updated medication list at time of discharge AND Check inpatient prescriptions against an internal formulary
The eligible hospital of CAH who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care provides a summary care record for each transition of care or referral	<i>Not a Meaningful Use Stage 1 measure</i>	Generate summary of care record for relevant transitions of care AND Send summary of care records to an unaffiliated organization using a different certified EHR vendor AND Does your hospital electronically exchange/ share clinical/ summary care record in any format with one or more of the provider types listed below: <ol style="list-style-type: none"> 1) Hospitals inside your system OR 2) Hospitals outside your system OR 3) Ambulatory providers inside your system OR 4) Ambulatory providers outside your system
Capability to submit electronic data to immunization registries or immunization information systems except where prohibited, and in accordance with applicable law and practice	<i>Not included in MU Stage 1 measure creation¹</i>	Submit electronic data to immunization registries per MU standards
Capability to submit electronic reportable lab results to public health agencies except where prohibited, and in accordance with applicable law and practice	<i>Not included in MU Stage 1 measure creation¹</i>	Submit electronic data to reportable lab results to public health agencies on an ongoing basis per MU Standards

Meaningful Use Criteria	MU Stage 1 AHA IT Supplement Questions	MU Stage 2 AHA IT Supplement Questions
Capability to submit electronic syndromic surveillance data to public health agencies except where prohibited, and in accordance with applicable law and practice	<i>Not included in MU Stage 1 measure creation¹</i>	Submit electronic syndromic surveillance data to public health agencies on an ongoing basis per MU standards
Automatically track medications from order to administration using assistive technologies in conjunction with an electronic medication administration record (eMAR)	<i>Not a Meaningful Use measure¹</i>	Automatically track medications with an electronic medication administration record (eMAR)
<i>Menu Items</i>		
Record advance directives for patients 65 years old or older	Electronic documentation of Advance Directives	Electronic documentation of Advance Directives
Record electronic notes in patient records	<i>Not a Meaningful Use measure</i>	Electronic clinical documentation of Physician Notes AND Nurse Notes
Imaging results consisting of the image itself and any explanation or other accompanying information are accessible through a Certified EHR	<i>Not a Meaningful Use measure</i>	Electronic results viewing of Radiology Images AND Diagnostic Test Images
Record patient family health history as structured data	<i>Not a Meaningful Use measure</i>	Record patient family history as structured data
Generate and transmit permissible discharge prescriptions electronically (eRX)	<i>Not a Meaningful Use measure</i>	Electronic prescribing (eRX) of discharge medication orders
Provide structured electronic lab results to ambulatory providers	<i>Not a Meaningful Use measure</i>	Does your hospital electronically exchange/ share Laboratory results with one or more of the provider types listed below: 1) Ambulatory providers outside your system 2) Ambulatory providers inside your system

¹This measure was not included in the original mapping of the AHA IT supplement to Meaningful Use because it was not available in prior to 2013. We chose to continue to exclude this metric as part of our Meaningful Use measure for comparability to earlier work (see DesRoches CM, Charles D, Furukawa MF, et al. Adoption of electronic health records grows rapidly, but fewer than half of US hospitals had at least a basic system in 2012. *Health Aff (Millwood)*. 2013;32(8):1478-1485.).

Table B. Frequency of Each Number of Patient Engagement Health IT Capabilities by ACO Status, Weighted

Number of Patient Engagement Health IT	Non-ACO (n = 810) %	ACO (n = 393) %
0	8.8	3.4
1	49.9	23.5
2	17.7	17.9
3	8.5	15.4
4	4.9	10.1
5	4.8	15.4
6	4.1	11.2
7	1.4	3.2

ACO indicates accountable care organization; IT, information technology.

Table C. The Effect of ACO Participation and Organizational Factors on Health IT Adoption Among US Nonfederal, Acute Care Hospitals

	MU Stage 1 (OR, 95% CI)
ACO participant	1.13 (0.84-1.51)
Bed size	
Small (<99)	Ref.
Medium (100-399)	1.29 (0.91-1.82)
Large (>400)	1.93 (1.12-3.34)*
Ownership	
Gov't, non-federal	Ref.
Non-profit	1.27 (0.87-1.86)
For-profit	0.37 (0.15-0.35)*
Teaching status	1.36 (0.77-2.41)
System member	1.05 (0.73-1.52)
Region	
Northeast	Ref.
Midwest	1.73 (1.19-2.51)**
South	1.28 (0.85-1.92)
West	1.84 (1.17-2.89)**
Urban	1.18 (0.76-1.84)

ACO indicates accountable care organization; IT, information technology; MU, Meaningful Use; Ref, reference.

* $P < .05$; ** $P < .01$; *** $P < .001$.