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Meaningful use: Floor or ceiling?

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ABSTRACT

Background: In 2011, federal incentive payments for meaningful use of electronic health records (EHRs) began. This study evaluates the impact of the program on hospitals and EHR vendors, identifying how it affects EHR planning and development. Specifically, it assesses whether vendors and Chief Information Officers (CIOs) are viewing the meaningful use requirements as a floor – the minimally acceptable level of implementation, upon which development continues – or as a ceiling – the upper-bound on EHR development and implementation.

Methods: The study combines interviews with EHR vendors and hospital CIOs with EHR adoption data from American Hospital Association surveys. Results from interviews with 17 hospital and system CIOs (representing 144 individual acute-care hospitals) and 8 EHR development executives (representing two-thirds of installations) are detailed. Furthermore, it compares adoption of two key EHR functions, BCMA and CPOE, which are treated differently under stage 1 of the incentive program.

Results: Three key findings emerge from the study. First, meaningful use requirements can serve as either a floor or a ceiling, depending on the abilities of institutions implementing EHRs. Second, the increasing focus on achieving meaningful use across both hospitals and vendors risks missing the forest of health care system change through the trees of meeting discrete requirements. Third, while the meaningful use incentive program has accelerated the development and implementation of some key functions, it has also slowed development of others.

Conclusions: Policy makers should craft subsequent stages of the incentive program to ensure smaller facilities and additional features necessary for health care system change are not left behind.

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1. Introduction

The introduction of federal incentive program for health information technology has served as a powerful motivating force, driving adoption of comprehensive electronic health records (EHRs) across the United States.¹ The program, which provides financial reimbursement for hospitals demonstrating their adoption and “meaningful use” of certified EHR systems, takes a step-by-step approach toward its goal of ensuring that the vast majority of US hospitals use comprehensive electronic systems by 2020.

In 2011, the Centers for Medicare and Medicaid Services (CMS) allowed hospitals to begin to attest to successful achievement of the stage 1 requirements and by February of 2013 it was clear that CMS had greatly exceeded its goals. Among hospitals, nearly 4300 have registered for stage 1 of the incentive program, receiving over \$8 billion in payments. Research by DesRoches et al. and others suggests that the meaningful use incentive program has been successful at increasing the number of hospitals pursuing comprehensive EHR

adoption, but overall adoption is still progressing slowly, particularly in small, rural, and non-teaching hospitals.¹

To date, Jha et al., Desroches et al. and others have highlighted the extent of comprehensive EHR adoption and important variations in adoption by key hospital characteristics. But little has been done to find variations in which functions hospitals are adopting and how hospitals are choosing which functions to adopt. Furthermore, within the Health IT (HIT) industry we know little about how vendors and Chief Information Officers (CIOs) have responded to the meaningful use incentives in their planning and development. Given the significant effort required to meet the requirements set forth in stages 1 and 2 of the meaningful use incentive program, policy makers should be aware of whether vendors and CIOs are viewing the meaningful use requirements as a floor – the minimally acceptable level of implementation, upon which they will continue development and customization – or as a ceiling – the upper-bound on their EHR development and implementation efforts.

2. Study data and methods

This study uses a mixed-methods approach, combining semi-structured interviews with EHR vendors and hospital CIOs from

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across the United States with EHR function adoption data from American Hospital Association surveys. The quantitative analysis compares the adoption rates over time of two distinct functions with the shared goal of preventing medication errors – bar code medication administration (BCMA) and computerized physician order entry (CPOE). The two elements vary in their cost, time to implement, and their status with regards to meaningful use requirements. CPOE is the more expensive and time-intensive of the two, with estimates for cost and time of adoption placing the figures at approximately \$34,000 in 5-year costs per bed^{2–4} and 1–4 years per facility.^{4,5} BCMA adoption, by contrast, is estimated at averages of \$3000 per bed^{6–8} and 4–6 months per facility.⁸ While CPOE is included as a core function in stage 1 of meaningful use, BCMA was not required (or listed as a menu item). This provides an opportunity to track the growth rates of adoption of the two functions, which prior to the release of the stage 1 requirements held similar levels of support among HIT experts when evaluating clinical benefits.^{3,9,10} Prior to beginning analysis, our hypothesis was that the rate of CPOE adoption increased and the rate of BCMA adoption decreased after the release of meaningful use stage 1 criteria.

2.1. Quantitative component – data collection

2.1.1. American Hospital Association annual surveys and health IT supplemental – 2008–2011

During March–September of 2007–2010, the American Hospital Association surveyed all acute care hospitals about their health IT activities. A paper copy of the survey was sent to each hospital's chief executive officer, who asked the person most knowledgeable about the hospital's health IT efforts to complete it. Response rates varied from a low of 58% of all acute-care hospitals in 2011 to a high of 69% in 2009.

Following the methods laid out in Jha et al. I measure adoption of specific EHR functions in each hospital.¹² A function is counted as adopted by a given hospital in a given year if the hospital responded to the corresponding question in the AHA survey by stating that the function or analogous capability was fully implemented in one or more units. Analyses were conducted at both the 95% and 90% confidence levels. We find that all differences in time series results within the same category (e.g. within BCMA, the difference in adoption rate between 2009 and 2010) are significant at the 95% confidence level. Differences across categories (BCMA in 2009 vs CPOE in 2009) are not significant at the 95% confidence level, but are significant at the 90% confidence level. Results were estimated using both weighted and unweighted models, and there were no significant differences between methods. To demonstrate overall penetration, results weighted by number of beds are included below. Quantitative data was analyzed using the Stata statistical software (Version 11).

2.2. Qualitative component

To select hospitals to contact, we adopted a stratified sampling approach. All United States acute-care hospitals were grouped by size according to AHA definitions, and then randomized within those categories. When hospitals selected were part of a hospital system, we attempted to speak with both the hospital-level official responsible for implementation as well as the system-level official responsible. 15 Hospitals each from the small, random, and large categories (45 hospitals total) were contacted. CIOs from 17 hospitals and hospital systems agreed to participate. 45-minute semistructured interviews were conducted over the telephone and in person with the Chief Information Officer (CIO) or equivalent senior staff member directly responsible for EHR adoption decision-making at 17 hospital systems and independent hospitals,

Table 1
Characteristics of the 144 hospitals represented by respondents.

Characteristic	Mean number/ percent
Number of beds	283
Teaching status	
Teaching hospitals	35%
Non-teaching hospitals	65%
Location	
Rural	28%
Urban	72%
Profit status	
Not-for-profit	52%
For-profit	48%
Geographic region	
Midwest	18%
Northeast	25%
South/southeast	55%
West	2%
Hospital system membership	
System member	96%
Unaffiliated	4%
Hospital size^a	
Small	35%
Medium	36%
Large	29%

^a AHA hospital size definitions: small: 99 beds or fewer; medium: 100–399 beds; large: 400 beds or more.

representing a total of 144 individual acute-care hospitals.^b Respondents were responsible for a mix of small, medium and large facilities in urban and rural locations as well as a mix of for-profit and not-for-profit, and teaching and non-teaching facilities. Hospital CIO interviews included open-ended questions about how hospitals decided when to adopt EHRs, which functions they chose to adopt, and how stages 1 and 2 of the meaningful use regulations affected their decision-making (Table 1).

To identify subjects for EHR vendor interviews, we referenced HIMSS data measuring the top 10 EHR vendors by number of current hospital installations in 2012 and contacted the lead executive in charge of product development at each company. Representatives of all 10 leading hospital health IT vendors were contacted and 8 agreed to participate. According to HIMSS data, the 8 vendors contacted represent over two-thirds of all current hospital EHR installations. Vendor interviews included open-ended questions about how vendors made decisions on which functions to develop and improve, and how stages 1 and 2 of the meaningful use regulations affected their decision-making.

All interviews were conducted from December 2012 to March 2013. The authors conducted, transcribed, and coded all interview data using the qualitative research software ATLAS.ti (Version 6). To preserve anonymity, no identifying characteristics of the individuals contacted or the companies/hospitals they represent have been included here. All respondents, regardless of gender, are referenced using male pronouns to avoid identifying individual respondents. Data collection was approved by Harvard's Institutional Review Board (#F-22593-101) and appropriate confidentiality and data security procedures were followed.

^b Of hospital respondents, 13 represented hospital systems and 4 represented individual hospitals.

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