



Hospital adoption of API-enabled patient data access

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1. Introduction

Despite a decade of progress in the digitization of the U.S. health care system via electronic health record (EHR) adoption,¹ patient access to their own health data remains a challenge.² Recent policy efforts have prioritized patient access to EHR data via application programming interfaces (APIs).^{3,4} APIs use standards to connect third-party software, including mobile applications like Apple HealthKit,⁵ to EHRs for easy transmission of data.⁶ APIs can enable patients to download their data from the EHR and choose which applications can access that data. APIs may also facilitate bi-directional exchange of data between health care organizations, allow patients to contribute data into their provider's EHR system, and allow patients to aggregate their data from multiple EHR systems into a single record.⁷ Given the low level of interoperable data sharing⁸ and ongoing concerns over “information blocking”^{4,9} in hospitals, enabling access to data via APIs may facilitate a “leap forward” in electronic patient data exchange. Establishing an infrastructure where developers can leverage accessible EHR data to bring innovative new products to patients is an important step in moving towards a patient-centered and connected health care system.

Since APIs are a new technology in health care, little is known about hospital adoption of API-enabled patient data access. We sought to determine the extent of patient API access in US hospitals, and whether hospitals varied in their API access adoption by organizational characteristics and EHR vendor. Our results provide an important baseline for both policymakers crafting regulations for patient access to health data as well as application developers looking to create new technologies leveraging EHR data.

2. Materials & methods

2.1. Data

We used data from the American Hospital Association Annual Survey - IT Supplement to identify hospitals that allow patient API access and other measures of hospital characteristics detailed below. The 2017 survey received a response rate of 64%, and our dataset included 3514 hospitals in the United States.

2.2. Measures

2.2.1. API-enabled patient data access

Our primary outcome variable was a dichotomous measure of whether or not a hospital allowed patients to access their data with applications using an API. We identified hospitals that answered “Yes” to the question “Are patients treated in your hospital able to do the following: Access their health information using any applications configured to meet the application programming interfaces (API) specifications in the EHR?” as having API-enabled patient data access, and those hospitals who answered “No” or “Do Not Know” as not being API-enabled.

2.2.2. Electronic health record vendor

We identified the EHR vendor for every hospital in our sample using the question “Which vendor below provides your primary inpatient EHR/EMR system?” All vendors with over 100 respondents were identified by name, while 11 vendors with fewer than 100 hospitals were grouped as “Other EHR Vendors.”

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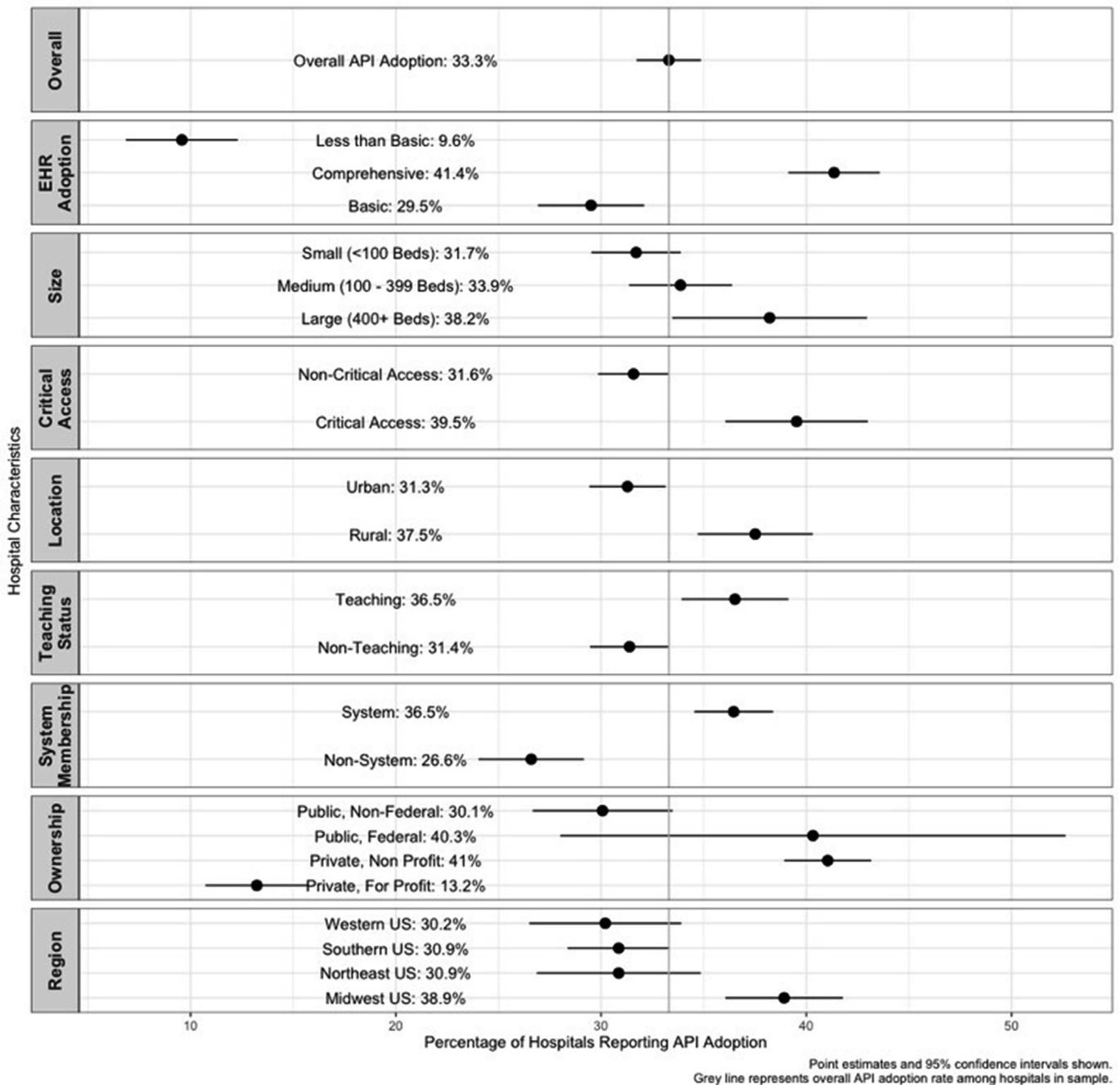


Exhibit 1. Hospital Adoption of APIs for Patient Health Data Access by Hospital Characteristic. Source/Notes: SOURCE Authors' analysis of AHA Annual Survey Information Technology Supplemental data. NOTES N = 3514 hospitals in the United States. Percentage estimates and 95% confidence intervals shown with points and whiskers, respectively. Gray line represents overall reported hospital API adoption for comparison.

2.2.3. Hospital characteristics

We identified a set of hospital characteristics that we expected to be related to adoption of API-enabled patient data access.¹⁰ These included level of EHR sophistication,¹¹ hospital size (measured by number of beds: small hospitals fewer than 100 beds, medium sized hospitals between 100 and 399 beds, and large hospitals over 400 beds), critical access hospital (CAH) status, location in an urban or rural area, teaching status, health care system membership, hospital ownership, and the US census region.

2.3. Statistical analyses

We calculated the proportion of hospitals in our sample who reported that patients had access to their health data via applications using an API. Next, we calculated descriptive statistics on the proportion of hospitals who reported patient API data access across hospital characteristics and EHR vendors, using omnibus Rao-Scott chi-square tests for statistical significance. Finally, we created a multi-variate logistic regression model with hospital API adoption as our binary dependent variable and our set of EHR vendors and hospital characteristics as independent variables, using robust standard errors. We then plotted the average marginal effect (AME) estimates and 95%

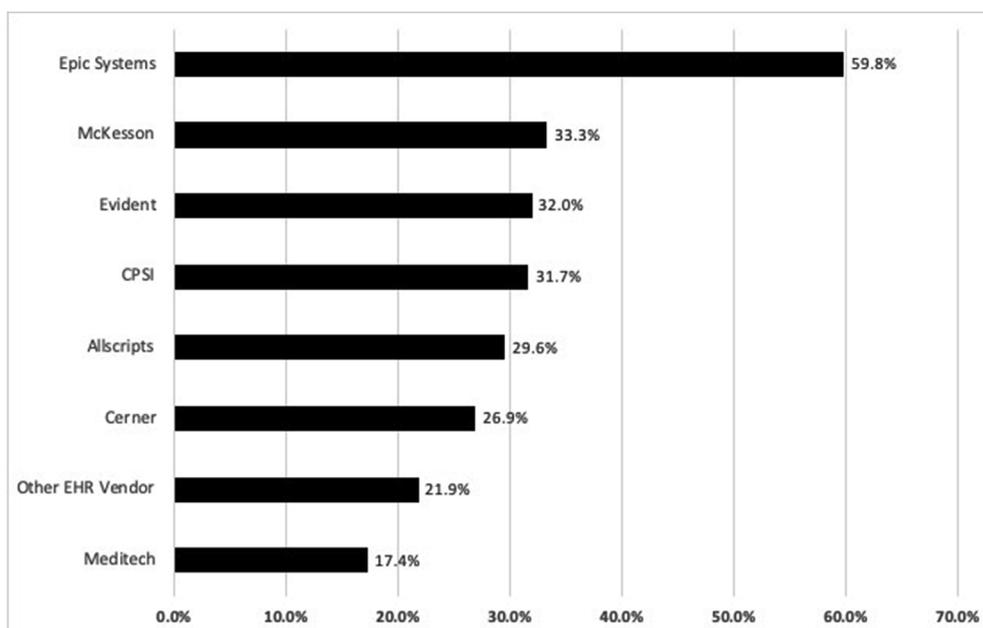


Exhibit 2. Hospital Adoption of APIs for Patient Health Data Access by EHR Vendor. Source/Notes: SOURCE Authors' analysis of AHA Annual Survey Information Technology Supplement data. NOTES N = 3514 hospitals in the United States. Hospital EHR vendor was identified by the question "Which vendor below provides your primary inpatient EHR/EMR system?" All vendors listed at more than 100 hospitals are listed by name; those with less than 100 are included in "Other EHR Vendor".

confidence intervals from our model in a forest plot.¹²

3. Study results

We found that 33.3% of hospitals reported that patients could access their electronic health data using applications using the EHR API. Hospitals with more sophisticated EHR systems, critical access hospitals, and hospitals located in rural areas had higher levels of API-enabled patient data access (Exhibit 1). Across EHR vendors, hospitals using Epic (59.8%) had the highest level of patient API access, followed by McKesson (33.3%), Evident (32.0%), CPSI (31.7%), Allscripts (29.6%), Cerner (26.9%), Meditech (17.4%), and other vendors (21.9%) (Exhibit 2).

In our multi-variate regression, we found that hospitals using Epic Systems had a significantly higher probability (AME = 0.20, $p < 0.001$) of having patient API access compared to other EHR vendors, and that hospitals using Meditech had a significantly lower probability (AME = -0.11, $p < 0.001$), adjusting for observed hospital characteristics (Exhibit 3). Rural hospitals were more likely to have API access (AME = 0.07, $p < 0.001$) compared to urban hospitals.

4. Discussion

Our study using recent national hospital data found that one-third of hospitals reported that patients could access their health data via applications configured to meet the API standards. This level of adoption may be partially explained by the nascence of API regulations, as the standards for access were only finalized in the recent 21st Century Cures Act.⁴ Another possible reason adoption is not higher may be a lack of a mature business case for application developers and hospitals, especially given low uptake of data access among patients.¹³ Despite the early stage and immature business case, our findings provide important baseline estimates for tracking hospital API adoption for patient health data access over time.

We found large differences in API adoption across EHR vendors. Nearly sixty percent of hospitals using Epic reported patient access to health data via applications using an API, almost double the next highest vendor, McKesson. These results were consistent even when adjusting for a range of hospital demographics in our multi-variate analysis: Epic remained the only vendor significantly positively

associated with API adoption. Given the cross-sectional nature of our data, we are unable to make causal claims with respect to this association; however, this finding encourages further research to explore the underlying mechanism.

Finally, we found that hospitals in rural areas were more likely to report patient access to health data via APIs compared to hospitals in urban areas. This finding is somewhat surprising, as in many cases rural hospitals have been shown to adopt health IT innovations more slowly than their urban counterparts,^{8,10,14–16} and we found no correlation between rural hospitals and usage of Epic as an EHR vendor. While these hospitals may have fewer resources to implement health IT, rural hospitals may prioritize patient access via API-enabled applications due to the importance of remote access in rural settings – rural hospitals are less likely to have alternative electronic data exchange capabilities such as health information exchange organizations.¹⁷ This is supported by analogous findings from the telehealth adoption literature, which has found a positive relationship between rurality and telehealth investment¹⁸ and preparedness.¹⁹

4.1. Limitations

Our results should be interpreted with several limitations in mind. Our data show whether a hospital allows access to patient electronic health data via an API, but does not capture extent of actual use.¹³ Our data are cross-sectional and descriptive, and we are unable to assess whether any hospital characteristics are causally linked to API adoption. We are unable to determine whether hospitals who did not answer the question (159 respondents) or those who responded "Don't Know" (313 respondents) are truly not API-enabled, however, we performed a robustness check on our results by excluding those hospitals and found results consistent with our main specification (Appendix Exhibits 4–6.) Finally, we used self-reported survey data, though AHA IT Supplement data have been validated against other sources.²⁰

5. Conclusion

We found that three in ten hospitals reported adoption of patient access to health data via APIs, with large differences across EHR vendor and regional rurality. Our results provide a useful baseline in measuring the proliferation API patient data access going forward, which is critical to evaluating the varied ways in which health data is transferred

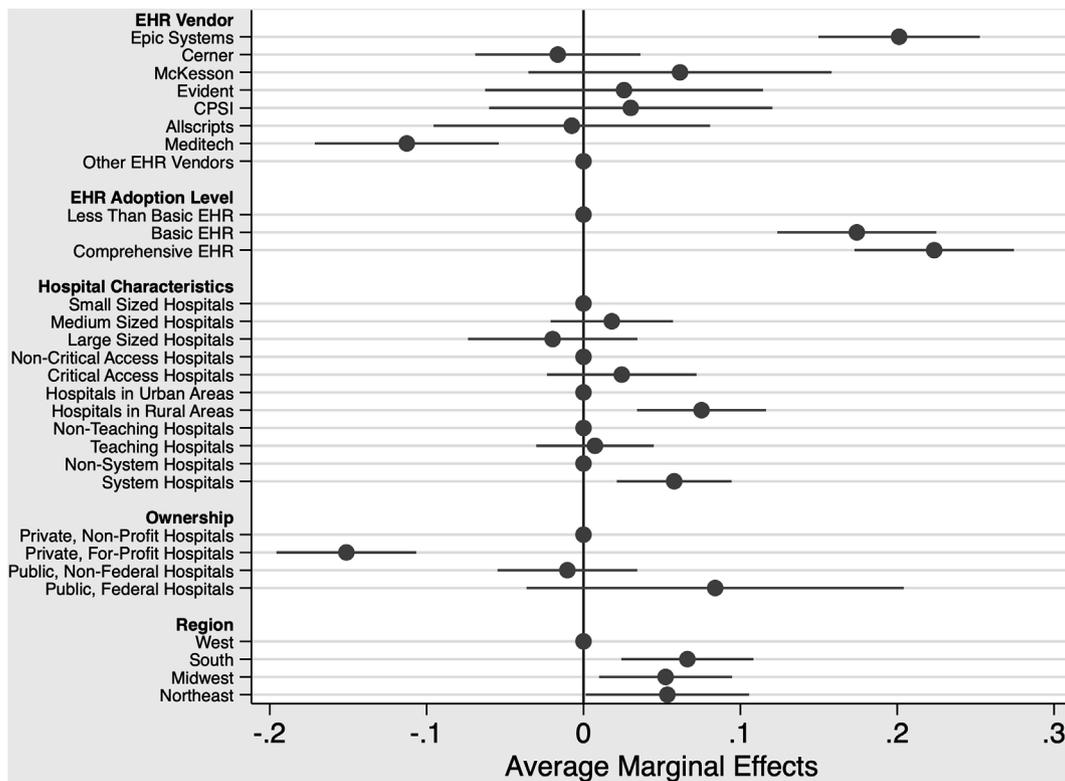


Exhibit 3. Factors Associated with Hospital Adoption of APIs for Patient Health Data Access.

Source/Notes: SOURCE Authors' analysis of AHA Annual Survey Information Technology Supplement data. NOTES N = 3514 hospitals in the United States. The figure shows the average marginal effects of a logistic regression model regressing hospital API adoption for patient health data access on the independent variables in the figure. The error bars represent 95% confidence intervals with robust standard errors. Bars that do not cross zero on the x-axis indicate a statistically significant relationship between the independent variable and hospital API adoption. The full results with average marginal effect estimates, p-values, and 95% confidence intervals are reported in Appendix Table 1, along with robustness checks using linear probability and probit regression models in Appendix Table 2 and Appendix Table 3.

electronically in the fragmented US health care system.

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Conflict of interest

Nate Apathy is a former employee of and holds stock equity in Cerner Corporation.
A Jay Holmgren has no conflicts of interest to report.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.hjdsi.2019.100377>.

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