Electronic Health Records in the Post-HITECH Era: Rethinking Vendor Performance and Certification

A Jay Holmgren, Doctoral Student, Health Policy Management
Three Key Points
Thee Key Takeaways

• There is significant variation across vendors in hospital Stage 2 Meaningful Use criteria performance

• Some vendors were consistently associated with higher performance, others had mixed results

• **BUT:** most variation in performance is not explained by vendor or other observable characteristics
Background and Significance
HITECH: Quick Overview

• 2009: Health Information Technology for Economic and Clinical Health

• $35 billion to support HIT adoption

• Medicare and Medicaid Electronic Health Record (EHR) Incentive Program
  • Ensure the “meaningful use” of EHRs

• ONC Health IT Certification Process
Meaningful Use

• Attestation necessary to receive subsidy (and avoid penalty in later stages)

• Multiple stages

• Core and Menu criteria

• "All or nothing" - must meet minimum threshold for each criteria to receive credit, no bonus for exceeding threshold
ONC EHR Certification Process

• Meant to ensure EHR products can meet Meaningful Use criteria

• Products submitted by vendors and certified by Office of the National Coordinator for Health IT process

• Recent changes in certification has moved towards self-report attestation of capabilities
eClinicalWorks Will Pay $155M to Settle False Claims Act Allegations

May 31, 2017 by Heather Landi

In addition to the monetary settlement, the vendor must give customers updated versions of their software free of charge and allow customers to transfer their data to another EHR software provider, without service charges
EHR Performance

• ONC certification guarantees only a minimum level of performance

• Anecdotal evidence of performance differences across products

• Prior studies detailing variation across vendors in the display of test results and clinical decision support

• Clear differences in design choices between vendors

What’s at Stake?

• EHR implementations are hugely expensive\(^1\)
  • Hundreds of millions of dollars in many large hospitals
  • Partners HealthCare: $1.2 billion!

• Quality / value-based payment

• Role of policymaking and regulation

Objective
Research Questions

• Does EHR vendor choice impact hospital performance on Meaningful Use criteria?

• Are those effects consistent across Meaningful Use criteria?

• How much performance is explained by vendor choice?
Methods
Data Sources

• Dependent variables: 6 Stage 2 Meaningful Use criteria scores
  • CPOE for Medications
  • View / Download / Transmission of Data Available to Patients
  • View / Download / Transmission of Data Used by Patients
  • Medication Reconciliation Performed
  • Summary of Care Record Electronically Created
  • Summary of Care Record Sent Electronically

• Independent variables of interest: Certified Health IT Product List database

• Control variables: American Hospital Association annual survey and IT supplement
Study Population

• Non-federal hospitals

• Those who had attested to Stage 2 Meaningful Use in 2014

• 1,436 unique hospitals

• Important caveats about sample apply here.
Analysis

- Descriptive statistics
- Ordinary least squares regression
- Robustness: instrumental variables
Results
# Sample Descriptive Statistics

<table>
<thead>
<tr>
<th>Hospitals with at least 1 certified criteria coming from this vendor:</th>
<th>Freq. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epic</td>
<td>393 (27.4)</td>
</tr>
<tr>
<td>Cerner</td>
<td>360 (25.1)</td>
</tr>
<tr>
<td>MEDITECH</td>
<td>282 (19.6)</td>
</tr>
<tr>
<td>McKesson</td>
<td>141 (9.8)</td>
</tr>
<tr>
<td>MEDHOST</td>
<td>109 (7.6)</td>
</tr>
<tr>
<td>Healthland</td>
<td>71 (4.9)</td>
</tr>
<tr>
<td>Allscripts</td>
<td>60 (4.2)</td>
</tr>
<tr>
<td>Other</td>
<td>137 (9.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EHR system characteristics</th>
<th>Freq. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete EHR</td>
<td>413 (28.8)</td>
</tr>
<tr>
<td>Modular EHR</td>
<td>1023 (71.2)</td>
</tr>
<tr>
<td>Among modular EHRs:</td>
<td></td>
</tr>
<tr>
<td>Only 1 vendor</td>
<td>561 (54.84)</td>
</tr>
<tr>
<td>More than 1 vendor</td>
<td>462 (45.16)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure of vendor fragmentation</th>
<th>Mean (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herfindahl-Hirschman index</td>
<td>0.92 (0.16–1.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance levels</th>
<th>Freq. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2 meaningful use</td>
<td></td>
</tr>
<tr>
<td>Medication CPOE</td>
<td>84.6 (60.1–100%)</td>
</tr>
<tr>
<td>View/download/transmit available</td>
<td>87.6 (50.1–100%)</td>
</tr>
<tr>
<td>View/download/transmit used</td>
<td>15.1 (5.1–100%)</td>
</tr>
<tr>
<td>Medication reconciliation</td>
<td>85.9 (50.4–100%)</td>
</tr>
<tr>
<td>Summary of care records provided</td>
<td>78.4 (50.2–100%)</td>
</tr>
<tr>
<td>Summary of care records sent</td>
<td>36.1 (22.0–100%)</td>
</tr>
<tr>
<td>Electronically</td>
<td></td>
</tr>
</tbody>
</table>
Hospitals in Top Quartile of Number of MU Criteria

Figure 1. Meaningful use achievement across criteria: counts of hospitals in the top quartile for Stage 2 meaningful use criteria by vendor.
Vendors Used by Hospitals in Top Quartile by Criteria

Figure 2. EHR vendors used by hospitals in the top quartile of Stage 2 meaningful use criteria by individual criterion.
## OLS Regression

<table>
<thead>
<tr>
<th></th>
<th>CPOE for Medications</th>
<th>VDT Available</th>
<th>VDT Used</th>
<th>Medication Reconciliation</th>
<th>SCR Created</th>
<th>SCR Sent Electronically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epic</td>
<td>10.33*</td>
<td>8.34*</td>
<td>24.62*</td>
<td>3.09*</td>
<td>-0.15</td>
<td>10.61*</td>
</tr>
<tr>
<td>Cerner</td>
<td>4.02*</td>
<td>0.64</td>
<td>14.70*</td>
<td>4.39*</td>
<td>-6.69*</td>
<td>2.89</td>
</tr>
<tr>
<td>MEDITECH</td>
<td>-1.13</td>
<td>-2.26</td>
<td>10.58*</td>
<td>-5.28*</td>
<td>3.80</td>
<td>1.08</td>
</tr>
<tr>
<td>McKesson</td>
<td>-2.39</td>
<td>-10.19*</td>
<td>7.43*</td>
<td>-4.00*</td>
<td>-7.58*</td>
<td>-5.75*</td>
</tr>
<tr>
<td>MEDHOST</td>
<td>-0.41</td>
<td>2.18</td>
<td>6.85*</td>
<td>-9.66*</td>
<td>3.48</td>
<td>-1.53</td>
</tr>
</tbody>
</table>

* Represents p < 0.05

Regressions included hospital control variables not shown including: ownership, size, RHIO participation, CAH status, teaching status.
## Instrumental Variables Regression

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Epic</strong></td>
<td>11.51*</td>
<td>15.61*</td>
<td>13.60*</td>
<td>5.88</td>
<td>-2.96</td>
<td>5.48</td>
</tr>
<tr>
<td><strong>Cerner</strong></td>
<td>-5.93</td>
<td>6.29</td>
<td>-23.33*</td>
<td>-2.24</td>
<td>-0.24</td>
<td>-26.33</td>
</tr>
<tr>
<td><strong>MEDITECH</strong></td>
<td>-2.04</td>
<td>-5.69</td>
<td>-4.38</td>
<td>8.20</td>
<td>-17.87</td>
<td>-24.74</td>
</tr>
<tr>
<td><strong>McKesson</strong></td>
<td>3.71</td>
<td>-18.15</td>
<td>2.00</td>
<td>-6.97</td>
<td>-13.37</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>MEDHOST</strong></td>
<td>3.71</td>
<td>1.18</td>
<td>0.09</td>
<td>0.37</td>
<td>13.63*</td>
<td>11.97</td>
</tr>
</tbody>
</table>

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Variation Explained by Observable Characteristics

- Summary Care Record Sent Electronically
- Summary Care Record Provided
- Medication Reconciliation
- VDT Used
- VDT Available
- CPOE for Medications

Explained by EHR Vendor | Explained by Observed Hospital Characteristics | Unexplained
Discussion
What Our Results Mean

• EHR vendor is significantly associated with performance on our Stage 2 Meaningful Use measures

• Some vendors are consistently positive, while others have mixed results

• Vendor choice matters, but not nearly as much as unobserved characteristics
For Practitioners

• EHR vendor choice matters

• Helpful data for making purchasing decisions

• BUT, other things matter more
For Policymakers

• There is significant variation in EHR products

• What is the goal of the certification process?

• How should we regulate EHR products?
Important Limitations

• Non-random sample

• Stage 2 Meaningful Use criteria are not a perfect proxy for quality

• Endogeneity / causality concerns (despite instrumental variables)

• No obvious next steps
Conclusion
Key Points Revisited

- There is significant variation across vendors in hospital Stage 2 Meaningful Use criteria performance.

- Some vendors were consistently associated with higher performance, others had mixed results.

- **BUT:** most variation in performance is not explained by vendor or other observable characteristics.
Thank You!