



Perceptions of Electronic Health Record Implementation: A Statewide Survey of Physicians in Rhode Island

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ABSTRACT

OBJECTIVES: Although electronic health record use improves healthcare delivery, adoption into clinical practice is incomplete. We sought to identify the extent of adoption in Rhode Island and the characteristics of physicians and electronic health records associated with positive experience.

METHODS: We performed a cross-sectional study of data collected by the Rhode Island Department of Health for the Health Information Technology Survey 2009 to 2013. Survey questions included provider and practice demographics, health record information, and Likert-type scaled questions regarding how electronic health record use affected clinical practice.

RESULTS: The survey response rate ranged from 50% to 65%, with 62% in 2013. Increasing numbers of physicians in Rhode Island use an electronic health record. In 2013, 81% of physicians used one, and adoption varied by clinical subspecialty. Most providers think that electronic health record use improves billing and quality improvement but has not improved job satisfaction. Physicians with longer and more sophisticated electronic health record use report positive effects of introduction on all aspects of practice examined ($P < .001$). Older physician age is associated with worse opinion of electronic health record introduction ($P < .001$). Of the 18 electronic health record vendors most frequently used in Rhode Island, 5 were associated with improved job satisfaction.

CONCLUSIONS: We report the largest statewide study of electronic health record adoption to date. We found increasing physician use in Rhode Island, and the extent of adoption varies by subspecialty. Although older physicians are less likely to be positive about electronic health record adoption, longer and more sophisticated use are associated with more positive opinions, suggesting acceptance will grow over time.

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As part of the American Recovery and Reinvestment Act of 2009, the Health Information Technology for Economic and Clinical Health Act allocated \$29 billion over 10 years for supporting the adoption and “meaningful use” of

electronic health records.¹ Electronic health records have great potential to improve healthcare by facilitating fast accurate patient data transmission, standardizing medical processes, enabling decision support, and allowing real-time medical error prevention, to name the major benefits.

Although the potential gains from adoption of such technology make intuitive sense, research has just started to demonstrate the efficacy of electronic health record use in the United States. Natural experiments with electronic health record introduction in a large integrated hospital system have shown improvement in adherence to evidence-based practice, overall reduction of markers of disease, decreases in hospital admissions, and emergency

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department visits.^{2,3} Other studies have shown decreases in total healthcare cost, ambulatory cost growth over time,⁴ improved process of care,⁵ and improved performance in disease screening.⁶

Despite this great potential and the growing evidence for efficacy of the electronic health record, physician implementation of electronic health records is far from universal. As of 2011, only 54% of physicians have adopted a complete electronic health record system or have some mix of electronic and paper records. Some of these systems reported as “mixed” can be rudimentary too, because programs like FileMaker Pro (FileMaker Inc, Santa Clara, Calif) can qualify as an electronic health record. As the first and only state (to our knowledge) to systematically assess and publicly report electronic health record adoption for every licensed physician providing patient care, Rhode Island provides an opportunity to identify characteristics of electronic health records and physicians that might enable better electronic health record integration in the future.

In this study of all physicians currently practicing in Rhode Island, we sought to accomplish 3 goals: (1) describe adoption of electronic health records by Rhode Island physicians; (2) describe how electronic health record implementation has changed elements of physician practice, such as workflow, patient care, and job satisfaction; and (3) find characteristics of physicians and their electronic health record system associated with positive experiences. We hypothesized that older age, late electronic health record adoption, and partial electronic health record adoption would be associated with more negative physician experiences.

MATERIALS AND METHODS

Study Design

This study has a cross-sectional survey design.

Study Setting and Population

The Rhode Island Department of Health administered the Health Information Technology Survey electronically over the course of 3 weeks in January and February of 2009 to 2013.⁷ The department used its licensure database to send letters and e-mails (when available) to all licensed physicians providing direct patient care. Participants who

did not complete the survey were excluded from these analyses.

Study Measurements

Survey questions included provider and practice demographics, information regarding electronic health record system, and Likert-type scale questions regarding how electronic health records have affected medical practice. Only closed-ended questions were used for this study.

Data Analysis

Survey response was calculated using the American Association for Public Opinion Research calculator V3.1.⁸ Responses were downloaded into Microsoft Excel (Microsoft Corp, Redmond, WA) and analyzed in STATA 13.0 (StataCorp LP, College Station, Tex). Missing, “not applicable,” and other responses were excluded from analysis, and “don’t know” responses were reported only when pertinent.

Summary statistics were used to describe respondents to the

2013 survey. Respondents were asked how electronic health record adoption had affected 6 elements of medical practice: job satisfaction, billing, internal communication, patient care, quality improvement, and workflow. Responses were extent of agreement with a statement of the pattern “electronic health record adoption improved *Job Satisfaction*,” for example, selecting one of “strongly disagree,” “disagree,” “agree,” or “strongly agree.”

A composite measure of how advanced a physician’s electronic health record was developed by assigning a point for every function that was used and summing them to yield a score out of 12: (1) drug interaction warnings at point of prescription; (2) prompts for patient-specific care at point of care; (3) reminder regarding indicated or overdue care; (4) patient demographics; (5) electronic list of medications; (6) electronic progress notes; (7) electronic problem lists; (8) clinical summaries for transfer of care or referral; (9) report of clinical quality measures; (10) transfer of laboratory test results electronically; (11) transfer of radiologic test results electronically; and (12) electronic prescribing. There were 122 electronic health record vendors in use by Rhode Island physicians in 2013, so a variable was created including only electronic health record used by 10 or more physicians, thereby allowing a more manageable analysis.

Student *t* test was used for continuous variables, and chi-square test was used for categorical variables to

CLINICAL SIGNIFICANCE

- Some 81% of physicians in Rhode Island use an electronic health record.
- Younger age, more patients with Medicaid insurance, hospital practice, practice in larger groups, primary care practice, and nonsurgical specialization are associated with increased electronic health record use.
- Most respondents think that electronic health record adoption has decreased job satisfaction. Experience varied significantly by electronic health record vendor.
- Longer and more sophisticated use were associated with a more favorable opinion of electronic health records.

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