Do provider attitudes about electronic health records predict future electronic health record use? ☆

Tara F. Bishop [a,b,*], Mandy Smith Ryan [c], Colleen M. McCullough [c], Sarah C. Shih [c], Lawrence P. Casalino [a], Andrew M. Ryan [a]

[a] Division of Outcomes and Effectiveness, Department of Public Health, Weill Cornell Medical College, New York, NY, USA
[b] Department of Medicine, Weill Cornell Medical College, New York, NY, USA
[c] The Primary Care Information Project, New York, City Department of Health and Mental Hygiene, New York, NY, USA

ABSTRACT

Introduction: Prior research has shown that provider positive attitudes about EHRs are associated with their successful adoption. There is no evidence on whether comfort with technology and more positive attitudes about EHRs affect use of EHR functions once they are adopted.
Methods: We used data from a survey of providers in the Primary Care Information Project, a bureau of the New York City Department of Health and Mental Hygiene and measures of use from their EHRs. The main predictor variables were scores on three indices: comfort with computers, positive attitudes about EHRs, and negative attitudes about EHRs. The main outcome measures were four measures of use of EHR functions. We used linear regression models to test the association between the three indices and measures of EHR use.
Results: The mean comfort with computers score was 2.37 (SD 0.53) on a scale of 1–3 with 3 being the most comfortable. The mean positive attitude score was 2.74 (SD 0.40) on a scale of 1–3 with 3 being more positive. The mean negative attitude score was 1.81 (SD 0.54) on a scale of 1–3 with 3 being more negative. Within the first twelve months of having the EHR, 59.5% of visits had allergy information entered into a structured field, 64.8% had medications reviewed, and 74.3% had blood pressured entered. Among visits with a prescription generated, 24.5% had prescriptions electronically prescribed. In multivariate regression analysis, we found no significant correlations between comfort with computers, positive attitudes about EHRs, or negative attitudes about EHRs and any of the measures of use.
Discussion: Comfort with computers and attitudes about EHRs did not predict future use of the EHR functions. Our findings suggest that meaningful use of the EHR may not be affected by providers' prior attitudes about EHRs.

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1. Introduction

Studies of the impact of electronic health records (EHRs) to improve quality of care have shown mixed results.[1–7] One possible explanation for these mixed results is that clinicians use EHRs more as electronic document writers and not as tools to better manage patients and to improve efficiency.[8,9] In order to improve meaningful use of EHRs, the Centers for Medicare and Medicaid Services launched the Electronic Health Record Incentive Program which paid out more than $5.7 billion to providers in the first year of the program.[10,11]

Prior research has shown that positive attitudes about EHRs are associated with successful implementation.[12–15] However, to our knowledge, there is no evidence on whether comfort with technology and more positive attitudes about EHRs prior to implementation affect use of EHRs once they are implemented. We hypothesize that providers who are comfortable using computers and who feel optimistic about their potential effects on patient care might use more features of the EHR.

In this study, we used data from a survey of providers who enrolled in the Primary Care Information Project (PCIP). PCIP is

a bureau of the New York City Department of Health and Mental Hygiene (NYC DOHMH) that subsidized EHRs for 3200 providers (most of whom were small practice providers) serving under-served areas of New York City. PCIP, as a nationally recognized regional extension center, currently provides technical assistance to providers to help them achieve meaningful use.[16]

We sought to address two research questions: (1) what were provider levels of comfort with computers and attitudes about EHRs prior to implementation of an EHR and (2) did provider reports of comfort with computers and attitudes about EHRs prior to implementation predict future use of EHR functions?

2. Methods

2.1. Data sources and sample

Primary data for the study came from a pre-implementation survey administered prior to going "live" on the EHR. The survey was developed by PCIP staff, and the goal of the survey was to measure providers' comfort with computer tasks (e.g., typing, printing) and expectations about EHRs (e.g., the EHR will improve medication safety, the EHR will disrupt workflow). The survey also solicited demographic data (e.g., how long the provider had been in practice, provider gender), their comfort level with computers, and their attitudes about EHRs. We obtained additional provider characteristics (provider work load, type of provider, provider specialty) for both survey responders and non-responders from SalesForce©, a customer relations management software used for tracking administrative data about participating practices.

The survey was sent to all providers who enrolled with PCIP. Providers were mailed an advance letter describing the survey after they enrolled with PCIP but before they implemented the EHR. Providers with email addresses were sent a web-based survey via SurveyMonkey©. Providers without an email address were mailed a paper survey. If there was no response after two weeks, providers were sent another email or paper survey. If there was no response after four weeks, PCIP staff called providers.

For this analysis, we included only data from small practices (ten or fewer providers). We excluded providers who eventually did not implement the EHR ($n=54$), were sent a survey after their EHR had been implemented ($n=18$), were a temporary employee of the practice or resident physician ($n=5$), were on leave at the time of the survey ($n=2$), or whose address was incorrect ($n=3$). This resulted in an invited sample of 654 providers. Among these 654 providers, 433 (66.2%) received the survey by email and 221 (33.8%) received it by mail. Among the 433 providers who received the survey by email, 227 (52.4%) were sent another email survey after two weeks and 91 (21.0%) were called after four weeks. Among the 221 providers who received the survey by mail, 176 (79.6%) were sent another mail survey after two weeks and 57 (25.7%) were called after four weeks.

Data on measures of use were transmitted directly from the EHRs to PCIP on a monthly basis. An office visit was defined as an encounter in which the provider recorded that the patient both checked in and checked out.

The study was approved by the Institutional Review Boards of Weill Cornell Medical College and the New York City Department of Health and Mental Hygiene.

2.2. Variables

The main predictor variables were scores on three indices: comfort with computers, positive attitudes about EHRs, and negative attitudes about EHRs. We chose these three indices because they have face value as indicators of provider attitudes

and because there was high internal consistency within each index but low correlation between the indices (correlation coefficients ranged from −0.0.02 to 0.28).

The comfort with computers index consisted of five questions assessing providers' comfort completing the following tasks: email, printing, restarting a computer, typing, and searching on the internet. Each question was recoded to a three point scale: uncomfortable, comfortable, and very comfortable. We computed a mean comfort score based on the answers to these five questions. The index had high internal consistency across the five questions (Cronbach's alpha=0.89).

The positive attitudes about EHRs index consisted of responses to the following five statements: (1) an EHR will improve my access to patient information when I need it, (2) an EHR will improve my ability to make decisions about patient care, (3) an EHR will improve my ability to provide preventative care, (4) an EHR will reduce medication errors and adverse drug events, and (5) I think the benefits of adopting an EHR will outweigh the challenges I have to overcome. Each question was recoded to a three point scale: disagree ("completely disagree" or "generally disagree"), unsure ("don't know"), and agree ("completely agree" or "generally agree"). For this index, we again calculated a mean score based on the answers to these five questions. The scale had high internal consistency (Cronbach's alpha=0.72).

The negative attitudes about EHRs scale consisted of responses to the following seven statements: (1) using an EHR will decrease the amount of time I can spend talking with patients, (2) using an EHR will cause disruptions to my workflow, (3) using an EHR will cause a patient visit to last longer, (4) the use of the computer in the exam room will interfere with the patient visit, (5) an EHR will generate too many alerts and reminders during the patient visit, (6) using an EHR will limit my discretion as a primary care provider, and (7) using an EHR will make it more difficult to protect patient privacy. Each question was coded using the same three point scale as the positive attitude score, but for this scale a high score equated to strong negative attitudes about the EHR. The scale had high internal consistency (Cronbach's alpha=0.74).

We standardized the scores for each question in each index by taking the z-score (mean of question score was subtracted from individual question score and divided by the standard deviation of the question score). As a result, scores for each item have a mean of 0 and a standard deviation of 1.

The main outcome measures were four measures of EHR use: (1) the percentage of visits with a documented blood pressure, (2) the percentage of visits where medications were reviewed, (3) the percentage of visits with allergy information entered into a structured field, and (4) the percentage of visits with a prescription generated and the prescription was electronically prescribed. We chose the four measures of use because they were closely aligned with the Stage 1 meaningful use measures and because they were the most reliable measures available from the electronic health record.[17] The use data is at the encounter-level and each encounter was credited to a provider even if staff performed a function. For the first three measures, the denominator was all visits; for the fourth measure (electronic prescription), the denominator was visits in which a prescription was generated. We calculated the outcome measures for the 12 month time period after EHR implementation. We had EHR use data for 302 of 328 respondents (92.1%). Data on EHR use was missing for a limited number of practices due to problems with transmissions.

2.3. Analysis

We used the Pearson Chi-square test to compare characteristics of responders and non-responders.