Trends in adoption of electronic health records by family physicians in Washington State

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ABSTRACT

Objective Electronic health record (EHR) adoption is encouraged by health plans, government agencies, and both the American Academy of Family Physicians and the Washington Academy of Family Physicians (WAFP), but rates of EHR adoption by family physicians in Washington were previously unknown. This study measured current rates of EHR adoption by family physicians in Washington State, as well as perceived barriers to adoption and what physicians identify as possible means to overcome those barriers.

Design A survey of medical practices in Washington State was performed. One physician per practice was selected to respond on behalf of their practice for all practices where family physicians work and for which contact information was available in the databases of the Washington State Medical Association (WSMA) and WAFP. The survey was distributed either electronically or in print form depending on availability of an email address.

Measurements Rates of EHR adoption, plans for adoption for those not yet using EHRs, perceived barriers to EHR adoption and perceived means to overcome those barriers.

Results Response rate was 43.8%. EHR adoption by this group is relatively high at 57.9% and did not vary by practice location. Although solo practices had a relatively high rate of adoption (43.5%), EHR adoption remains strongly associated with practice size. Identified barriers to implementation are primarily financial, as are the means to overcome those barriers. If current trends continue, adoption will plateau at approximately 68% in the next four years.

Conclusions Adoption rate appears to have peaked in this group given current constraints and barriers. Increased outreach efforts and assistance programs will be necessary to achieve EHR adoption in the remaining practices, particularly solo and small group practices.

Keywords: EHR adoption, family physicians, Washington State

Introduction

Overview

The adoption of electronic health records (EHRs) is being promoted by many organisations including health plans, patient advocacy groups, state and federal government agencies and medical professional societies. EHRs are believed to have the potential to improve quality of patient care and the efficiency of healthcare service delivery. Adoption of EHRs in the USA has remained fairly low and has lagged behind that of other Western countries. Studies of EHR adoption have generally focused on large, diverse and geographically dispersed provider groups.

Background

The Institute of Medicine (IOM) published a report in 1991 and another in 1997 describing computer-based patient records as an essential technology for health care. The ’Crossing the Quality Chasm’ report by the IOM called for greater use of EHRs and other clinical
information technology (IT) to improve patient safety and the quality of health care. In his State of the Union addresses in 2004, 2005 and 2006, President George W Bush called for all Americans to have EHRs by 2014. Various initiatives are under way to encourage adoption of EHRs but the effectiveness of these initiatives is uncertain and it is unclear if they address the barriers identified by physician practices.

Family medicine in particular has embraced EHRs as a foundation of the New Model of health care proposed by the American Academy of Family Physicians (AAFP). To educate and assist member family physicians regarding EHRs, the AAFP formed the Center for Health Information Technology. TransforMed is an initiative of the AAFP formed to assist practices in the transition to the New Model, including use of clinical IT.

Previous studies
A study of physicians of all specialties in Massachusetts conducted in 2005 identified a practice EHR adoption rate of 23%. Adoption was strongly correlated with practice size, with larger practices more likely to have EHRs. Most frequently cited barriers to adoption were start-up financial costs (84%), ongoing financial costs (82%), and loss of productivity (81%).

A similar study was conducted in Oregon in 2005 at the request of the state legislative assembly. Again, EHR adoption was strongly correlated with larger practice size. This study also focused on physicians of all specialties but also focused on geographic subregions of the state. EHR adoption measured at the level of the individual physician was 53.4%.

Several studies of family physicians in different states have been conducted. However, these studies were conducted at the level of the individual physician. In 2001, Loomis reported that for family physicians in Indiana, overall EHR use was 14.4%, with greater EHR use in larger urban practices. Menachemi et al reported similar results for family physicians in Florida in 2006: a 23.3% rate of routine EHR use and, as in the Indiana study, a positive association between EHR use and both practice size and non-rural practice location. Older physicians were found less likely to use EHRs than younger physicians.

Research objective
The purpose of this study was to evaluate current barriers to EHR adoption and what could be done to overcome these barriers. The decision to implement an EHR is made at the practice level, therefore this study was conducted at the practice rather than the individual physician level. The goal was to address the following research questions:

1. What is the current status of EHR adoption among family physicians in Washington?
2. What are the differences in EHR implementation rates by practice size or location?
3. What are the current barriers to EHR adoption?
4. What measures would enable practices to overcome these barriers and successfully adopt EHRs?

Methods

Sample
The target sample for the study survey was the practices where family physicians work, performing primary care. The WAFP has a directory of members supplied by its national parent organisation, the AAFP. The WSMA maintains a database of physicians in Washington State, including physician specialty and practice name or the designation ‘solo’ for those who are in solo practice. Using this report it was possible to determine the number of practices where family physicians work and also the number of family physicians in each group. Cross-referencing this report with the membership data of the WAFP, further contact information was associated with many of the physicians. Of particular interest was the availability of email addresses.

In Washington there has been a trend towards family physician practices aggregating into ‘practices without walls’. In such networks, practices frequently keep their original name but operate under the umbrella of a larger entity. Decisions such as implementing an EHR are made at the network level, therefore it was necessary to identify such networks and consider them as single practices for purposes of this study. Family physicians not practicing in an ambulatory primary care setting were excluded.

Using this methodology, a total of 464 practices where family physicians work were identified, representing a total of 1961 individual physicians. Practice size ranged from solo to the 187 family physicians belonging to the Group Health Cooperative who work in locations across the state.

From this list of 464 practices, an email address was available for at least one member of the practice in 166 cases. Of the 298 practices where no email address was available, mailing addresses were available for 125. For the remaining 173 practices, neither email nor mailing addresses were available.
Survey questionnaire

A survey was developed tailored to the research questions of interest. The survey was adapted from the work of Simon and used with the author’s permission. Questions focused on practice demographics, current use of information technology including EHRs, perceived barriers to EHR implementation and factors which might help overcome those barriers. In paper format, the final survey questionnaire was five pages in length and contained 27 questions (see http://www.radcliffe-oxford.com/journals/112_Informatics_in_Primary_Care/supplementary%20papers.htm).

Survey administration

With a total available sample size of 291, the decision was made to survey the entire available number of practices rather than a selected sample. This sample size was manageable and removed the complexity of selecting a representative smaller sample with all the potential confounding variables, including practice size and location. Survey of a total available population of this size is consistent with generally accepted size and location. Survey of a total available population of this size is consistent with generally accepted recommendations.

The survey was administered between January and March 2007 and co-ordinated by the author and the WAFP office. In order to conduct the survey as economically as possible, it was elected to use SurveyMonkey (www.surveymonkey.com) as the survey collection tool. In order not to bias the survey results by only surveying those practices with an available email address, it was elected to send the survey in paper format to those practices where no email address was available. Responses to the paper survey were then entered into SurveyMonkey along with those that had been collected electronically.

When an email address was not available, the invitation was sent by mail with a paper copy of the survey enclosed. Surveys were sent by email to 166 practices and mailed to 125 practices. Those invited to participate by email received up to a total of two follow-up invitations requesting their participation. A single follow-up mailing was sent to those invited by mail who did not respond to the first mailing.

The study protocol was approved by the Institutional Review Board – Spokane (Study #1KB 1349).

Data analysis

Electronic responses to the survey were entered directly into SurveyMonkey by the respondent. Paper survey responses were then entered into SurveyMonkey by the investigator and an assistant. The tools built into SurveyMonkey were used for most of the data analysis. Additional data analysis was performed using SPSS for Windows 12.0.

Results

Respondent characteristics

Of the 125 mailed surveys, 17 were returned as undeliverable with no forwarding address. Of the remaining 108 mailed surveys, 42 were returned, giving a response rate of 38.9%. Seventy-eight email responses were received, giving an email response rate of 47.0%. A total of 120 surveys were returned, yielding a total response rate of 43.8%.

Respondents self-classified their practice location as: rural, suburban, urban and mixed locations (sites in more than one category). Practices with more than one location were asked to respond to the practice location question with ‘check all that apply’. Type of practice for the respondents is displayed in Table 1.

The survey asked ‘Does your practice have components of any EHR, that is, an integrated clinical information system that tracks patient health data, and may include such functions as visit notes, prescriptions, lab orders, etc?’ Using this definition, EHRs are being used in 57.9% of practices responding to the survey. By practice location: 52.5% of rural practices, 55.0% of suburban practices, 55.6% of urban practices and 100% of those practices with mixed locations report using an EHR. The eight practices in the mixed location category had a median size of 46 physicians.

Barriers

Respondents were asked to rate ten potential barriers to EHR adoption on a 3-point Likert scale with 1 being not a barrier, 2 a minor barrier and 3 a major barrier (Table 2). Start-up financial costs, ongoing financial costs and training and productivity loss were rated as the three greatest barriers. Privacy or security concerns were rated the lowest barrier by both groups.

Strategies to overcome these barriers were a particular focus of this study. Respondents were asked to rate those measures which they felt would help overcome the barriers they identified (Table 3). Rating was on a 4-point Likert scale with 1 being not at all, 2 very little, 3 somewhat and 4 very much. Grants, increased reimbursement for using an EHR and technical assistance were identified as those most helpful. Pay for performance and interest free loans were felt to be least helpful. Of those practices with an EHR, 18% reported receiving practice income for having information systems such as an EHR and 23% reported receiving practice income for their use of such systems.

Expense of implementing and maintaining an EHR is clearly a concern for those who have not yet adopted. Capital resources for such a project were rated as
limited' by 53.5% of practices and 'no resources' by 23.3% of practices. In evaluating difficulty in funding varying levels of expense, costs of $10,000 to $25,000 per physician were rated 'very difficult' by 30% and 'impossible' by 38% of practices, while costs of greater than $25,000 per physician were rated by 25% of practices as very difficult and by 60% as impossible.

One strategy that has been utilised to decrease the expense per physician in implementing an EHR is for physicians to collaborate with other physicians or a large organisation. Of those who have not yet adopted an EHR, 47.6% said they would consider this option. Their local hospital was the most frequently identified potential partner, followed by other community practices and government. Of those who would not consider

<table>
<thead>
<tr>
<th>Table 1 Practice type of survey respondents</th>
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<tbody>
<tr>
<td>How would you best characterise your practice?</td>
</tr>
<tr>
<td>Solo family medicine practice</td>
</tr>
<tr>
<td>Family medicine group, partnership or network</td>
</tr>
<tr>
<td>Primary care group or partnership (family medicine plus other primary care providers)</td>
</tr>
<tr>
<td>Multi-specialty group or partnership</td>
</tr>
<tr>
<td>HMO</td>
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<tr>
<td>Community health centre</td>
</tr>
<tr>
<td>Residency</td>
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<tr>
<td>Other</td>
</tr>
<tr>
<td>Total respondents</td>
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</tbody>
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<table>
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<tr>
<th>Table 2 Barriers to EHR adoption (total respondents 116)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much of a barrier is each of the following to beginning or expanding the use of computer technology in your practice?</td>
</tr>
<tr>
<td>Computer skills of your providers/staff</td>
</tr>
<tr>
<td>Computer technical support</td>
</tr>
<tr>
<td>Lack of time to acquire knowledge about system</td>
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<tr>
<td>Start-up financial costs</td>
</tr>
<tr>
<td>Ongoing financial costs</td>
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<tr>
<td>Training and productivity loss</td>
</tr>
<tr>
<td>Physician scepticism</td>
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<tr>
<td>Privacy or security concerns</td>
</tr>
<tr>
<td>Lack of uniform standards within industry</td>
</tr>
<tr>
<td>Technical limitations of systems</td>
</tr>
</tbody>
</table>

Percentages may not total 100 due to rounding.
this option, loss of autonomy and the challenges of such collaboration were the most cited reasons.

Respondents were asked how much of a role different organisations did or do play in their deciding whether to adopt an EHR. The only group identified with a significant influence was their own practice group. Professional societies, larger practice networks, managed care plans and the Doctors Office Quality-IT (DOQ-IT) program had very little identified influence.

Those respondents who had not yet implemented an EHR were asked their future plans with regard to an EHR. Implementation was under way in 6.2% of practices. Definite implementation plans with timing from one to five years were reported by 31.2% of practices. Implementation had been attempted and abandoned in 6.2%. The remaining practices either had no specific plans (18.8%) or did not plan to implement an EHR (37.5%). Extending the EHR plans of these practices to EHR adoption to date would indicate adoption rate has reached its peak (Figure 1). If current trends continue, cumulative adoption in this group over the next four years will plateau at approximately 68% (Figure 2).

### Table 3 Overcoming barriers (all respondents; total respondents 105)

<table>
<thead>
<tr>
<th>How much do you feel each of the following would assist your practice in implementing a new computer system such as an EHR?</th>
<th>Not at all % (n)</th>
<th>Very little % (n)</th>
<th>Somewhat % (n)</th>
<th>Very much % (n)</th>
<th>Response average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support</td>
<td>7 (7)</td>
<td>10 (11)</td>
<td>22 (23)</td>
<td>61 (64)</td>
<td>3.37</td>
</tr>
<tr>
<td>Interest-free loans</td>
<td>19 (19)</td>
<td>19 (19)</td>
<td>33 (33)</td>
<td>29 (29)</td>
<td>2.72</td>
</tr>
<tr>
<td>Grants</td>
<td>10 (10)</td>
<td>3 (3)</td>
<td>25 (25)</td>
<td>63 (64)</td>
<td>3.40</td>
</tr>
<tr>
<td>Increased reimbursement for utilising an EHR</td>
<td>5 (5)</td>
<td>8 (8)</td>
<td>30 (31)</td>
<td>57 (58)</td>
<td>3.39</td>
</tr>
<tr>
<td>Pay for performance</td>
<td>16 (16)</td>
<td>24 (23)</td>
<td>38 (37)</td>
<td>22 (21)</td>
<td>2.65</td>
</tr>
</tbody>
</table>

![Figure 1 EHR adoption by year with future forecast from survey results](image-url)
There was a statistically significant association between presence of students and residents in a practice and the practice’s use of an EHR (odds ratio 2.15; 95% confidence interval, 1.01 – 4.58). Solo practices in the study group had a relatively high rate of EHR adoption of 43.5%, much greater than the 14% rate for solo practices in the study by Simon. Despite this high rate of EHR adoption in solo practices, adoption was much greater in groups of seven or more physicians at 79.2% (odds ratio 4.94; 95% confidence interval, 1.57 – 15.52). Practices of two to six physicians had an intermediate adoption rate of 61.4%.

Of particular concern are those practices that have no plans or plan not to implement an EHR. Solo practices comprise 75.9% of this group. Practices in this group self-classified as 40.7% rural, 29.6% suburban, and 29.6% urban. Available capital resources were described as limited or no resources by 84%.

Limitations
A design limitation of this study was that it specifically focused on family physicians in Washington. It is unclear how these results might extend to physicians in other specialties in Washington or to family physicians in other states. The scope of the survey was limited by the availability of contact information for practices. Email or mailing addresses were available for 291 of the 464 possible practice respondents, i.e. 62.7%. Those without an available email or mailing address may differ in EHR adoption and attitudes about EHRs.

The overall response rate of less than 50% could also introduce bias. For those completing the survey electronically, most of the questions required a response before proceeding to the next question, resulting in more complete survey responses compared to those completing a paper survey, although the paper surveys only rarely had missing responses. The higher email versus mail response rate may introduce bias into the survey results. Questions to those practices that had implemented EHRs regarding why they chose to implement them and what factors enabled their implementation might have yielded useful information.

Discussion
These results demonstrate a high degree of EHR adoption in the study group of 57.9%. That this is a higher rate than previous studies may indicate more rapid adoption in this group or simply that over time adoption has been increasing. It is interesting to note there was no difference in adoption rate across practice locations whether rural, suburban or urban. This would appear to indicate that for this group, practice location did not significantly impact on the interest in or the barriers to implementing an EHR. The 100% adoption rate for practices with mixed sites appears to

Figure 2 Projected cumulative EHR adoption

![Projected cumulative EHR adoption](image)
be primarily related to those practices being larger. EHR adoption did vary by practice size, but even solo practices had a high EHR adoption rate of 43.5%. It is also interesting to note the number (22) of different EHRs being used in this group and that no one EHR had a very large market share. This limits the potential for vendor specific local or state-wide collaboration via user groups to enhance use of a particular EHR.

The association of the presence of an EHR in a practice and presence of students and residents was also identified in the study by Simon. This association was felt to be possibly explained by the fact that a practice’s teaching status is a surrogate marker for physicians with a propensity toward technology or quality improvement efforts or alternatively that medical students and residents are functioning as catalysts for the office practices that house them to adopt EHRs. Also, trainees may be more likely to choose practices with EHRs for their clinical rotations. Many practices now consider that having an EHR enhances their ability to recruit new physicians to the practice.

The primary barriers to implementation identified were the initial and ongoing expenses of implementing an EHR and loss of productivity during implementation and training. The rating of privacy and security concerns as a barrier is lower than in previous studies and may indicate a greater level of comfort with this issue as EHRs are more widely used.

With the EHR implementation barriers identified being largely financial, it is not surprising that the identified means to overcome those barriers were also financial. Respondents describe their financial resources as limited and their ability to afford EHRs as challenged. Grants to assist with initial implementation costs and increased payment for using an EHR were identified as the means which would best assist practices. Unfortunately, of those with EHRs only a small number of practices report receiving such payments. From this information it would appear that programs that provide such grants and increased reimbursements will be necessary to encourage and enable EHR implementations in these remaining practices. Technical assistance was also identified as important. Programs such as DOQ-IT do provide some assistance but it is unclear if the scope of this program is enough to meet this need. For some practices, collaboration with local hospitals, health plans or government to collectively implement an EHR may assist in overcoming both financial and technical barriers. It is also possible that some competitive advantage demonstrated by those practices with EHRs may create market pressure for remaining practices to implement them.

In looking at the adoption among this group back to 1990, and the implementation plans of those currently not having EHRs, it would appear that a peak is being reached in the adoption curve for this group. Those practices in the later phase of the adoption curve are likely to require more assistance. This survey confirms the findings of other studies that physicians describe professional societies, government and health plans as having little influence on a practice’s decision to implement an EHR. This is certainly a subjective question and it is possible that such groups have exerted an influence not recognised by physicians.

Recently announced initiatives may be helpful in promoting EHR adoption. The American Recovery and Reinvestment Act of 2009 (ARRA) includes financial rewards beginning in 2011 for ‘meaningful use’ of electronic medical records by physician practices. Funds are also provided to the Office of the National Coordinator for Health Information Technology to establish regional extension programs to provide implementation assistance. This combination of financial and technical assistance may be ‘just what the doctor ordered’. Outreach efforts will be necessary to engage those practices not planning to implement an EHR as well as those struggling to make this decision.

Conclusion

Washington family physicians demonstrate a high rate of current EHR use that does not vary from rural to urban locations but does vary by practice size. Identified barriers to practices implementing an EHR are largely financial and the identified means of overcoming these barriers include grants and a guaranteed increased revenue stream from higher payments for using an EHR. The group appears to be at the peak of the adoption rate for new practices per year implementing EHRs and a plateau of approximately 68% adoption projected based on current trends. Progress in achieving further adoption by the remaining practices will be challenging and require programs to educate them about the benefits of EHR and to specifically address the barriers of cost and need for technical assistance – especially for solo practices. The data obtained in this study may serve as a basis for development and promotion of such programs.

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CONFLICTS OF INTEREST

None.

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