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Readiness for electronic health records: comparison of characteristics of practices in a collaborative with the remainder of Massachusetts

Steven R Simon MD MPH
Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care, Boston, MA, USA

Rainu Kaushal MD MPH

Chelsea A Jenter MPH
Division of General Internal Medicine, Brigham and Women's Hospital, Boston, MA, USA

Lynn A Volk MHS
Department of Clinical and Quality Analysis, Partners HealthCare System, Inc, Boston, MA, USA

Elisabeth Burdick MS
Division of General Internal Medicine, Brigham and Women's Hospital, Boston, MA, USA

Eric G Poon MD MPH

Alexis Z Tumolo
Department of Clinical and Quality Analysis, Partners HealthCare System, Inc, Boston, MA, USA

Micky Tripathi PhD
Massachusetts eHealth Collaborative, Waltham, MA, USA

David W Bates MD MSc
Division of General Internal Medicine, Brigham and Women's Hospital, Boston, MA and Department of Clinical and Quality Analysis, Partners HealthCare System, Inc, Boston, MA, USA

ABSTRACT

Objective The Massachusetts e-Health Collaborative (MAeHC) is implementing electronic health records (EHRs) in physicians' offices throughout three diverse communities. This study's objective was to assess the degree to which these practices are representative of physicians' practices statewide.

Design We surveyed all MAeHC physicians (n=464) and compared their responses to those of a contemporaneously surveyed statewide random sample (n=1884).

Measurements The survey questionnaire assessed practice characteristics related to EHR adoption, prevailing office culture related to quality and safety, attitudes toward health information technology (HIT) and perceptions of medical practice.

Results A total of 355 MAeHC physicians (77%) and 1345 physicians from the statewide sample (71%) completed the survey. MAeHC practices resembled practices throughout Massachusetts in terms of practice size, physician age and gender, prevailing financial incentives for quality performance and HIT adoption and available resources for practice expansion. MAeHC practices were more likely to be located in rural areas (9.5% vs 4.4%, P=0.004). Physicians in both samples responded similarly to six of seven self-assessments of the office practice environment for quality and safety. Internet connections were more prevalent among MAeHC practices than across the state (96% vs 83%, P<0.001), but similar proportions of MAeHC physicians (83%) and statewide physicians (86%) used the internet daily (P=0.19).

Conclusion MAeHC is implementing EHRs and health information exchange among communities

with physicians and practices that appear generally representative of Massachusetts. The lessons learned from this pilot project should be applicable statewide and to other states with large numbers of physicians in small office practices.

Keywords: health information technology, quality of care, regional health information organisations

Introduction

Regional health information organisations (RHIOs; Box 1) and other local and statewide efforts have emerged as a driving force in the effort to expand health information technology (HIT) and to establish meaningful electronic health information exchange (HIE).[1] To date, more than 250 such organisations have been formed, generally with goals of increasing adoption of electronic health records (EHRs) and promoting HIE, with a wide array of organisational structures, strategies, and tactics.[2] As these organisations mature and as greater numbers of RHIOs and other HIT/HIE consortia form to meet the national goal of universal EHR implementation and robust clinical data exchange by 2014, policy makers will look to ongoing and successful programs as models for design and implementation.

Box 1 What is an RHIO?

A Regional Health Information Organisation (RHIO) is a group of organisations and stakeholders that has come together for the purpose of electronic data exchange and is focused on improving the quality, safety, and efficiency of healthcare delivery. An RHIO may be legally defined as a neutral organisation that adheres to a defined governance structure which is composed of and facilitates collaboration among the stakeholders in a given medical trading area, community, or region through secure electronic health information exchange to advance the effective and efficient delivery of health care for individuals and communities. The geographic footprint of an RHIO can range from a local community to a large multi-state region. The term 'RHIO' and Health Information Exchange (HIE) can be used interchangeably.

From the Healthcare Information and Management Systems Society (HIMSS)[3]

The Massachusetts e-Health Collaborative (MAeHC; www.maehc.org) was formed in 2004 to bring together the state's major healthcare stakeholders in order to increase use of HIT and to improve safety, quality and efficiency of health care in Massachusetts. As a pilot demonstration project in advance of a statewide EHR implementation effort, MAeHC has deployed robust EHRs in the offices of more than 95% of physicians in three diverse communities in Massachusetts and has established electronic clinical data exchange among disparate physician offices within each of the communities. The evaluation of MAeHC's demonstration project will yield essential information for statewide expansion within Massachusetts, including: estimates of the time and resources necessary for community-wide implementation of EHRs; the barriers to and facilitators of HIE and the effects of EHR adoption and HIE on healthcare quality and safety. In addition, this pilot program will yield a rigorous assessment of the costs and benefits of community-wide and regional HIT expansion efforts, including a determination of how the costs and benefits are allocated among physicians, hospitals, payers (insurers and employers) and other stakeholders.

While the evaluation of the Collaborative's demonstration projects will undoubtedly provide relevant data for a statewide expansion within Massachusetts, policy makers will ask whether the experience of MAeHC is generalisable across and beyond Massachusetts, to RHIOs and other multi-stakeholder organisations with similar goals of fostering HIT adoption and establishing HIE. If the practice characteristics and attitudes toward HIT among physicians in the Collaborative pilot communities at baseline were similar to those of physicians across Massachusetts, it would be more likely that the findings of the MAeHC 'experiment' might have broad generalisability, both within and beyond Massachusetts. We therefore undertook a survey of the readiness for EHR adoption among physicians in MAeHC at baseline and compared this with a contemporaneous survey of a random sample of physicians throughout Massachusetts. This survey assessed existing HIT infrastructure, attitudes regarding the role of computers in health care, perceived barriers to HIT adoption and perceptions of the physicians' office practice environment relating to patient safety and quality of care.

Methods

The sampling methods, as well as the methods of survey development and administration, have been described elsewhere for the statewide survey[4,5] and are summarised below, along with the corresponding methods for surveying MAeHC physicians. The study protocol was approved by the Partners HealthCare Human Research Committee.

Statewide survey

We identified the population of all physicians practicing in Massachusetts in spring 2005. After excluding physicians who were residents in training, retired or without direct patient-care responsibilities, the total population of physicians was 20 227. These physicians practiced in 6174 unique practice sites. We drew a stratified random sample of 1921 practices and randomly selected one physician per practice. After excluding practices that had closed, the final sample size was 1884 physicians.

We developed an eight-page survey questionnaire. A series of questions assessed physicians' perceptions of how computers would affect eight dimensions of clinical practice. The survey asked about physician and practice characteristics including primary care vs specialty, number of visits per week, number of physicians, and number of other clinicians and staff functioning in the office. It also asked about internet connectivity and current use of HIT. In addition, the survey asked about financial incentives for use of health information technology and for quality of care performance. The survey also asked physicians to indicate their satisfaction with their current practice situation and to rate the severity of the following problems: isolation from colleagues, personal or professional stress, long work hours and feeling demoralised about the state of medical practice. Some of these questions were based on published surveys.[6–11] One of the survey questions was, 'Does your main practice have components of any electronic health record (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.?' Physicians who responded affirmatively were considered to have adopted an EHR and were excluded from this analysis to allow equitable comparison with physicians in the Collaborative, who did not have EHRs at the time of the survey.

We administered the statewide survey by mail, with multiple reminders to encourage response, between June and November 2005. With the initial mailing, we included a $20 cash incentive to encourage participation.

The Massachusetts e-health collaborative (MAeHC)

MAeHC is a non-profit corporation formed as a multi-stakeholder consortium in 2004 for the purpose of establishing an interoperable EHR system that would enhance the quality, efficiency and safety of health care in Massachusetts. MAeHC is supported by a $50 million grant from Blue Cross Blue Shield of Massachusetts and by in-kind contributions from its stakeholder organisations. After competitive processes to identify participant communities and technology vendors, the Collaborative launched a demonstration project in April 2005 in three diverse and disparate communities in Massachusetts: Northern Berkshire (North Adams and Williamstown); Lower Merrimac Valley (Newburyport) and greater Brockton. These communities were selected from among more than 35 applicants on the basis of the breadth and depth of participating provider network; the organisation and commitment of stakeholders, including physicians, healthcare institutions and community leaders; and prior and ongoing participation in other relevant activities, such as clinical data exchange and quality improvement efforts. More than 95% of the practicing physicians in the three selected communities agreed to participate in the program, which entails the implementation of interoperable EHRs and electronic clinical data exchange between community hospital and physicians' offices and directly between offices of participating physicians. EHR deployment began in March 2006 and will be completed by March 2008.

MAeHC survey

We surveyed MAeHC physicians using the same survey instrument that was developed for the statewide survey, with minor formatting modifications. In September and October 2005, we mailed the survey questionnaire, along with other administrative documents, to all 464 physicians who had signed agreements to participate in the Collaborative. Physicians were instructed to complete the survey and return it to MAeHC, either directly to an MAeHC practice consultant visiting the physician's practice site or by mail. Because participation in evaluation was a condition for involvement in the MAeHC, we did not include a cash incentive for the MAeHC physicians to complete the survey.

Statistical analysis

We used chi-squared tests and Student's *t*-tests, as appropriate, to compare the responses of physicians in the Collaborative with those of the randomly sampled

physicians from throughout the Commonwealth. The data were analysed using the SAS 9.1 (SAS, Cary, NC) statistical software package.

Results

From the statewide sample, a total of 1345 completed questionnaires was returned, a response rate of 71%. We excluded 551 of these respondents who indicated that their practice had an EHR, leaving 794 subjects for analysis. A total of 355 (77%) MAeHC physicians responded to the survey, none of whom had EHRs at the time of the survey.

Practice characteristics and finances

Physicians in the Collaborative were similar to physicians across Massachusetts in terms of gender, age and years of practice since completing medical school. MAeHC practices were more likely to be located in rural areas (9.5% vs 4.4%, P=0.004). There was no difference in the average size of the office practices, as measured by the number of physicians within the practice. Similar proportions of physicians in the Collaborative and the statewide sample reported that they were full or partial owners of their practices.

The presence or awareness of incentives for HIT adoption and quality of care may be important determinants of successful EHR implementation. Table 1 shows that similar proportions of physicians in MAeHC practices and the statewide sample reported having incentives related to HIT adoption, HIT usage, patient satisfaction scores and clinical quality measures.

There was no appreciable difference in reported assessments of the capital available for practice expansion or improvement. A total of 78% of physicians in MAeHC reported that their practices had limited or no capital for expanding or improving their practice, as compared with 76% of physicians across Massachusetts (P=0.67). Only 1% of physicians in the Collaborative and 3% of the statewide sample indicated that their practices had extensive capital available for practice expansion or improvement.

Office practice environment and culture

Physicians in the statewide sample and those in MAeHC responded similarly on six of seven self-assessments of the office practice environment for patient safety and quality of care (Figure 1). The only significant difference observed was the proportion of physicians who agreed with the statement, 'We have quality problems in our office'. Thirty percent of physicians across the Commonwealth agreed with this statement, as compared with 18% of physicians in MAeHC (P<0.001).

HIT infrastructure

Nearly all MAeHC physicians (96%) reported that they had an internet connection in their practice, compared with 83% of physicians across Massachusetts (P<0.001). Among physicians with internet access in the practice, 92% of MAeHC physicians indicated that

Table 1 Reported incentives for HIT adoption and clinical quality performance among physicians in MAeHC and statewide samples

Physician, personal earnings related to ...	MAeHC communities (n=464)	Statewide (n=794)	P value
Types of electronic information systems you have (e.g. EHRs, e-prescribing)	18.0%	15.6%	0.44
The amount you use electronic information systems	13.4%	13.3%	0.97
Patient survey results (e.g. satisfaction)	17.0%	15.8%	0.73
Clinical quality (e.g. 'pay for performance')	23.5%	22.9%	0.85

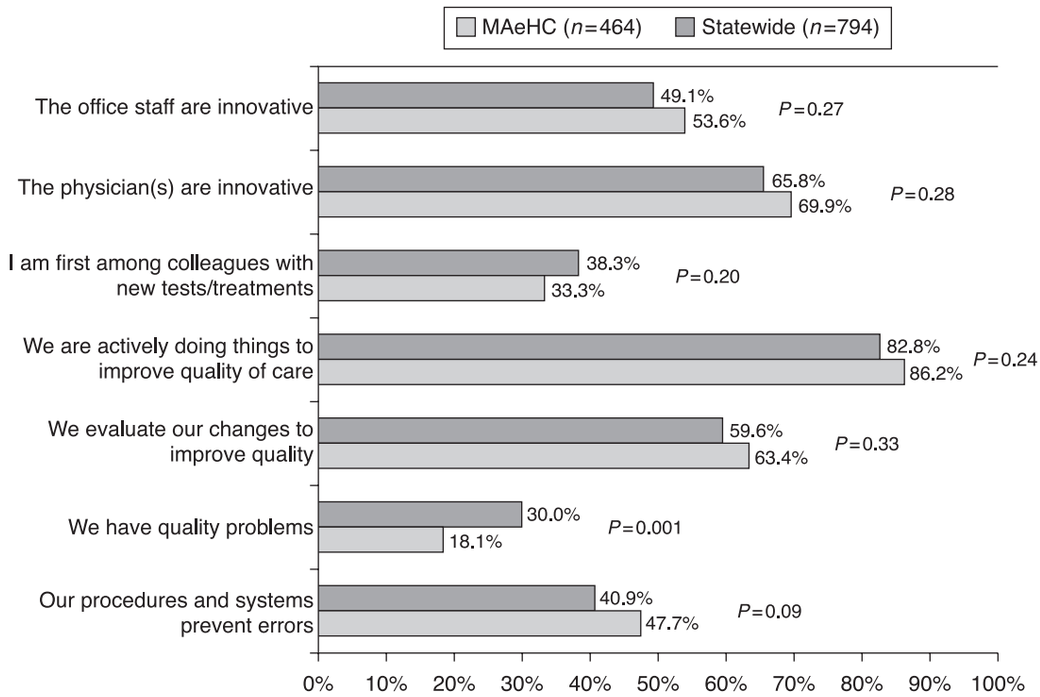

Figure 1 Responses to seven self-assessments of the office practice environment for patient safety and healthcare quality

their office had a high-speed connection (e.g. DSL or T1 line), as compared with 87% of physicians across the Commonwealth (P=0.09). Similar proportions of MAeHC physicians (83%) and physicians across Massachusetts (86%) reported that they use the internet daily (P=0.19). There was no significant difference in the proportion of practices that have email (71% of MAeHC practices versus 67% of statewide practices, P=0.25).

Effect of computers on health care

Figure 2 shows the proportion of physicians in the Collaborative and statewide samples who indicated that computers would have a positive effect on each of eight dimensions of health care. In general, MAeHC physicians were more likely to report that computers would have positive effects. The area of greatest discrepancy between MAeHC physicians and physicians sampled from throughout the Commonwealth was in the perception of how computers would affect the costs of health care. A total of 68% of MAeHC physicians indicated that computers would have a positive effect on controlling healthcare costs, compared with 55% of physicians in the statewide sample (P<0.001). There were no significant differences between the groups on their perceptions of how computers would affect patient–doctor communication, clinicians' access to up-to-date knowledge and the efficiency of providing care.

Barriers to HIT adoption

Physicians in MAeHC and across Massachusetts reported similar barriers to beginning or expanding the use of computer technology in their practices, but MAeHC physicians were consistently more likely to report more barriers to adoption (Figure 3). However, half or more physicians in both the Collaborative and across Massachusetts identified each of the ten factors as actual barriers to HIT adoption. The greatest variance between MAeHC and the remainder of the state was in the perception of computer technical support as a barrier; 81% of MAeHC physicians identified this factor as a barrier, compared with 50% of physicians across the state (P<0.001).

Life in clinical practice

Figure 4 indicates the extent to which a variety of key factors have affected life in clinical practice for physicians. Sizable proportions of physicians in both the Collaborative and across the state reported high levels of personal or professional stress, working long hours and feeling demoralised. Nevertheless, a majority of

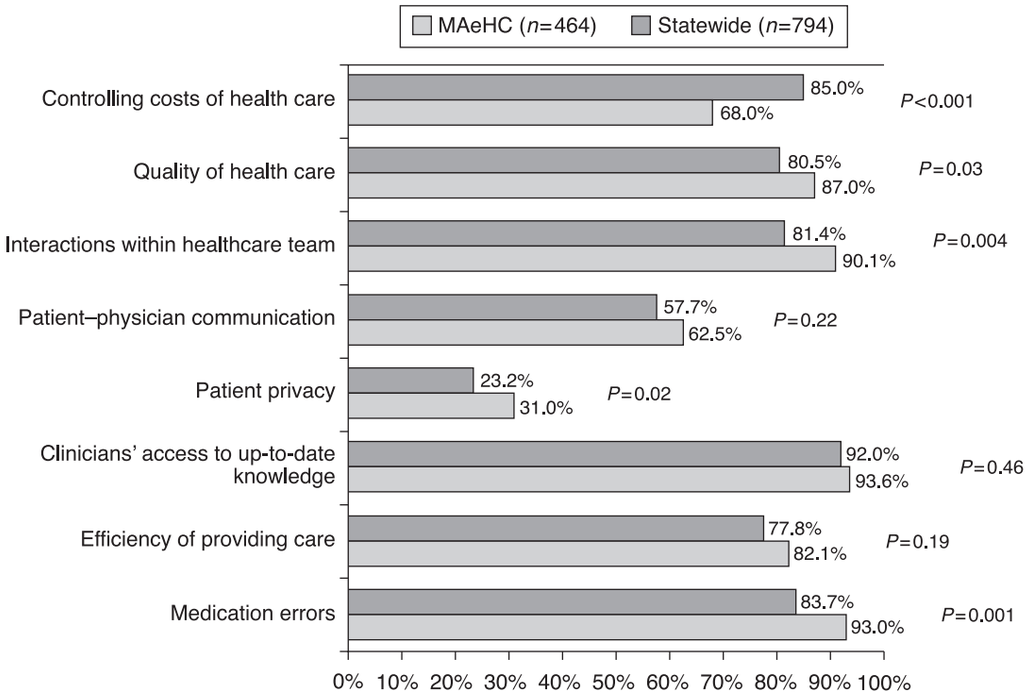

Figure 2 Perceived effects of computers on health care among MAeHC participants and statewide survey respondents

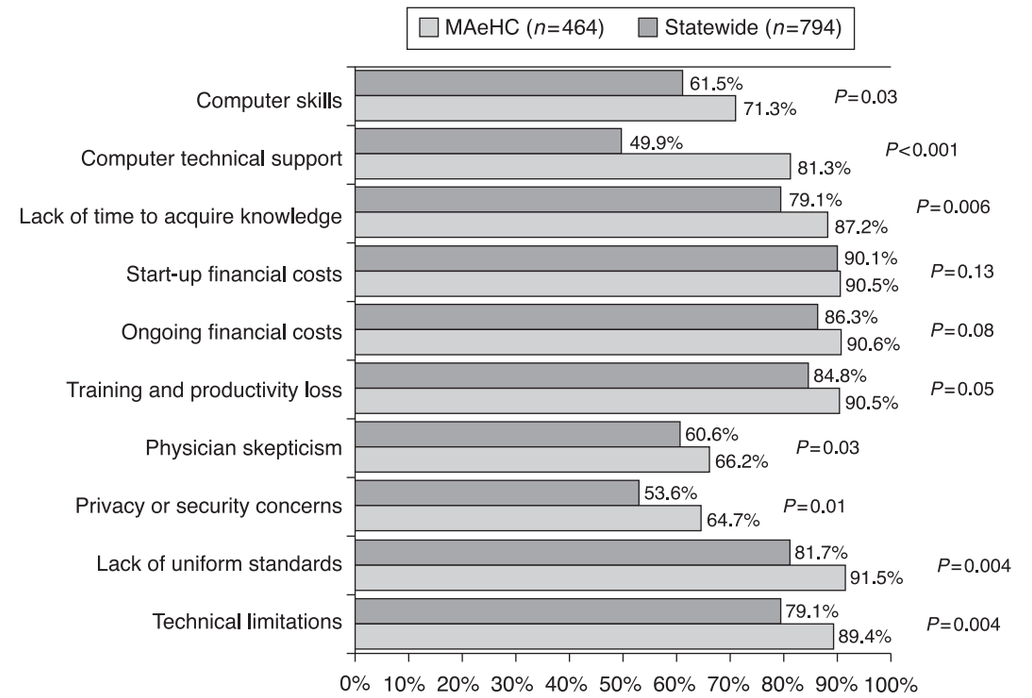

Figure 3 Perceived barriers to HIT adoption among MAeHC participants and statewide survey respondents

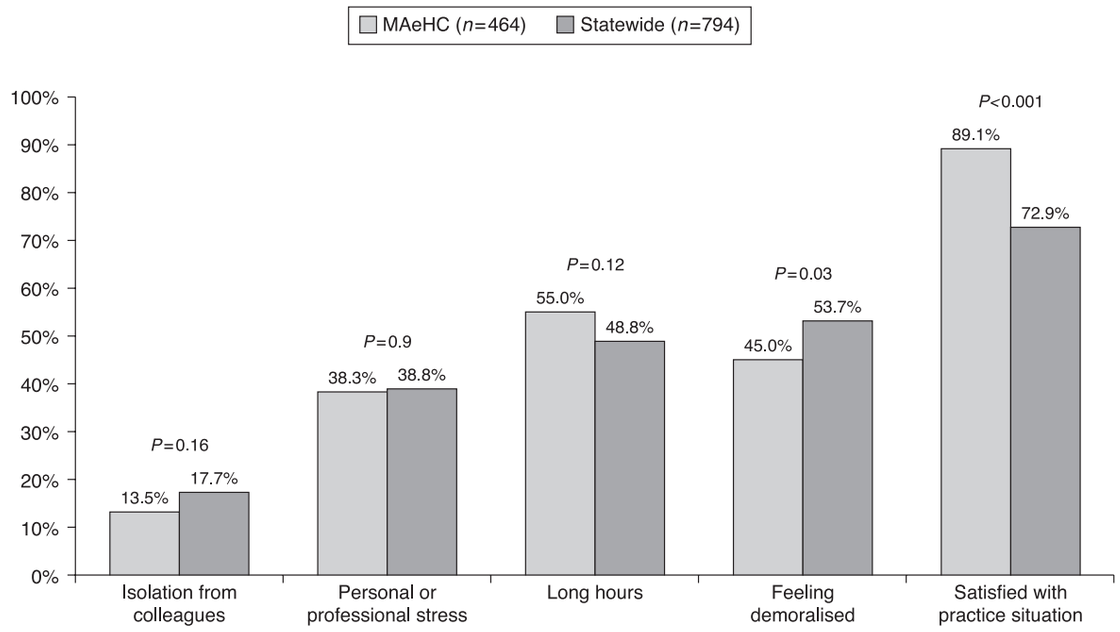

Figure 4 Reported concerns related to the practice of medicine and overall satisfaction with practice among MAeHC participants and statewide survey respondents

physicians in MAeHC (89%) and across the state (73%) remain satisfied with their practice situation, with higher levels of satisfaction seen among MAeHC physicians ($P<0.001$).

Discussion

Across the country, RHIOs and other multi-stakeholder organisations have commenced efforts to expand the adoption of HIT, principally EHRs, and to establish robust clinical data exchange in office practices. Existing programs and others in the planning stages may benefit from the results of current demonstration projects, such as MAeHC's effort to establish universal EHR implementation in three communities in Massachusetts; however, the generalisability of this kind of program will depend, in part, on the extent to which the participants represent the broader population of physicians and practices. In this study, we found that physicians and practices in MAeHC appeared generally similar to the population of physicians and practices throughout the Commonwealth of Massachusetts, in terms of demographics, office practice environment and structure, incentives and resources available for HIT adoption and the challenges facing physicians in ambulatory care practices. Physicians in MAeHC were more likely than their colleagues throughout Massachusetts to have optimistic views of the role of computers in health care, yet MAeHC physicians were also more likely to identify barriers to HIT adoption.

The similarities between MAeHC participants' characteristics and responses and those of the physicians from across Massachusetts reflect the intentions of MAeHC's process, that included attention to identifying a representative study population, of selecting the three communities for the demonstration program.[12] MAeHC strove to include a broad range of physicians and practices from diverse geographic and socioeconomic sectors of Massachusetts, so that the experiences of the demonstration project would inform the subsequent planned statewide rollout of EHR implementation and concurrent establishment of a statewide health information network, in conjunction with the MA-SHARE program[13] and other stakeholders. The finding that MAeHC practices at baseline resembled the rest of the state in terms of practice size, existing HIT infrastructure and incentives for quality and HIT adoption provides compelling evidence that MAeHC programs and strategies will have similar impact when extended beyond the three pilot communities.

The divergence between MAeHC physicians and the statewide sample in their perceptions of computers in health care and the barriers to HIT adoption deserves exploration. We observed that MAeHC physicians were more likely than physicians across the state to report that computers would have positive effects on a wide array of dimensions of ambulatory practice

and healthcare delivery. Furthermore, and perhaps on the surface appearing contradictory, MAeHC physicians were also more likely to identify barriers to beginning or expanding the use of computer technology in their practices.

Given the timing of the survey, we believe that the differences observed between the MAeHC practices and the statewide sample reflect the intensified interest in HIT among the MAeHC communities that led to and was a result of their selection for participation in this pilot program; because EHR implementation followed the survey administration, it is not plausible that EHRs themselves resulted in the differences observed. We note that MAeHC physicians were surveyed on the eve of undertaking EHR implementation and the commensurate workflow redesign and office staff restructuring and retraining. As such, MAeHC physicians, whose communities had come together in the prior year to be selected as demonstration program participants and who had been entrenched in an intensive phase of pre-implementation contract negotiation and vendor selection, may have become sensitised to both the potential benefits of EHRs and to the magnitude of the transformation on which they were about to embark. Furthermore, MAeHC physicians' participation in the pilot program may have generated optimism that resulted in higher levels of satisfaction with their practice situation.

The strengths of this study include the representative sample of physicians from across Massachusetts, with a high rate of response from both the statewide sample and the practices within the three MAeHC pilot communities. The data for this comparison were collected prior to the actual implementation of the demonstration program, so the program itself is unlikely to have had a measurable effect on MAeHC practice characteristics, though MAeHC physicians' attitudes and perceptions may have been influenced, as discussed above.

This study has several important limitations. First, this study has compared MAeHC participants with the general population of physicians and practices in Massachusetts; the study was not designed to compare MAeHC physicians to the population of physicians and practices across the United States. While the study provides persuasive evidence that the MAeHC experience will be generalisable across Massachusetts, more caution will be needed when applying MAeHC results to other states and regions. However, to the extent that other states resemble Massachusetts in having a large number of physicians practicing solo or in small offices, the results should be relevant. Another limitation of this study is that the surveys were administered to and collected from MAeHC practices in a slightly different manner than the statewide sample. As a result, MAeHC physicians may have been somewhat more predisposed to a social desirability bias, possibly reflected in their more positive views of computers in health care; however, this was not evident in other domains of the survey.

Conclusion

We found that the participants of MAeHC's demonstration program resembled physicians and practices from across Massachusetts, supporting the notion that the results and lessons learned from the Collaborative will be generalisable to a statewide rollout using similar strategies and tactics. As the lessons learned and quantitative results of MAeHC's demonstration program begin to emerge, these experiences and outcomes should also provide useful information to RHIOs and other similar programs attempting to expand HIT and foster electronic clinical data exchange in communities nationwide.

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CONFLICTS OF INTEREST

None.

ADDRESS FOR CORRESPONDENCE

Steven R Simon
Department of Ambulatory Care and Prevention
Harvard Medical School and Harvard Pilgrim Health Care
133 Brookline Avenue, Sixth Floor
Boston, MA 02215
USA
Tel: +1 (617) 509 9938
Fax: +1 (617) 859 8112
Email: steven_simon@hphc.org

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