EMR adoption among office based physicians and practices: Impact of peer-to-peer interactions, peer support and online forums

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Abstract

Recent government incentives as part of the Health Information Technology on Economic and Clinical Health (HITECH) Act [1] for EMR adoption has improved the adoption rate of EMR across the country; however, there is still a lag in adoption of EMR among small to medium practices. The main reason cited so far is the insufficiency of the financial incentives and disagreement or lack of intention to meet the 'meaningful use' criteria set forth by the government as a return for receiving the incentives. Many studies have and still continue to focus on the economic aspect of technology adoption, which has led to a glaring gap in studies that focus on other socio-cultural aspects of technology adoption. This paper looks in to the impact of peer support and online forums for EMR adoption. Preliminary results support the study hypotheses and hold important implications for future research and practice.

1. Introduction

Recent reports [2,3] (Decker et al, 2012; Hsiao et al, 2012) show that the adoption rate of EMRs among office-based practices has a significant lag especially in rural areas and older practices. Further, there is significant adoption lag among solo and two-physician practices (compared to medium and large practices) as well as among specialty care practices (compared to primary care practices). While EMR adoption among office based practices are increasing rapidly as the financial incentives are rolling out and as the penalty date is getting closer, there are still many practices that haven't decided yet or do not have the intention of adopting EMRs. There is also speculation as to whether the government incentives will be able to meet the demand of these late adopters. In addition, among practices that are in the process of adopting EMR, there is a very high failure rate – for example, studies show that up to 80% of EMR implementations fail [4,5]. Finally, the financial incentives for adoption are contingent on meeting the 'meaningful use' criteria set forth by the CMS [6]. Many physicians that are availing the government financial incentives have doubts as to whether they could meet even the meaningful use stage I [3,7].

Information technology adoption in healthcare has been significantly slower than that in other industries. One of the most cited reasons from healthcare organizations for the slow IT adoption has been financial reasons and as a result most studies in the healthcare area have placed considerable focus on economic factors as the main impediment to adoption [8,9,10,11,12]. While there has been some research on organizational factors and individual-level factors [13,14,15], the focus on socio-cultural factors and especially communication perspective has been relatively limited [16]. A communication perspective (that also incorporates knowledge transfer) could shed light on the current state of EMR adoption that is lagging even after providing financial incentives [16]. Similarly, the sociological (or socio-cultural) perspective emphasizes that innovation adoption is situated in a social (cultural) context and implies that the norms and values of the individual, the larger community of the individual, and the organization that the individual belongs to, all can influence adoption [16]. Hence, to understand the impediments of EMR adoption fully, it is necessary to incorporate complementary theoretical perspectives—particularly behavior science and socio-cultural perspectives.

The current study adopts such a behavioral and socio-cultural perspective and empirically investigates the impact of online forums and peer support on EMR adoption among small practice physicians. Next, we provide the theoretical background for our study.

2. Theoretical Background

2.1 Learning, Social Contagion, and Social Cohesion:

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The adoption of complex technologies such as EMR calls for effective communication among adopters and the potential for transferring experiential knowledge and learning. Such a communication and knowledge transfer perspective of technology adoption also ties in well with the notion that health care organizations need to increasingly become learning organizations to enforce radical changes and bring about transformation in services, practices, and processes [17]. There are several barriers to establishing a learning culture in health care organizations [15,18], ranging from the complex hierarchical work structure to physician resistance towards learning and sharing knowledge.

An important factor that affects learning is the mode of communication in the health care organization. Much of the information flow within a hospital involves health care workers communicating directly with one another [19]. In fact, face-to-face communications constitute half of such communications, while communication through electronic devices (pagers, phones, etc) accounts for the other half [19,20]. With the increasing number of staff and hospital workers, this type of communication (face-to-face or phone) has been found to be highly interruptive and is a leading cause of errors. Coiera and Tombs [20] observed that communication among employees in a hospital environment often leads to interruption-driven work contexts, where miscommunication or ineffective communication is the norm. Thus, in this kind of environment, getting physicians and other staff to communicate with one another and engage in knowledge sharing becomes challenging and potentially makes EMR adoption very difficult.

There is a critical need for health care organizations to implement good communication policies that are engaging and productive rather than disruptive [19]. The provision of a communication infrastructure that utilizes new communication technologies may enable health care workers to not only communicate important task-related messages, but also take part in other productive conversations. Evidence indicates that online communities and communities of practice where physicians can share information through online forums have the potential to address many of the deeply rooted cultural factors that inhibit the development of a learning culture in health care organizations [21-23]. Such forums allow adopters of new technology to not only share their experiences related to the new technology, but also describe their own innovations or reinventions.

This issue becomes even more problematic when it comes to small practice physicians. They are often hard to reach through advertisements and promotions; further, sometimes they resist innovation as a group, which makes mass communication methods ineffective. They may not be working in any healthcare organization or hospitals and hence organizational level methods are not applicable to many of them. There are several physicians who run small practices, where they interact with a few people in their profession and go for professional conferences once a year. They also go for training and other requirements that offer CPE credits. Current methods and strategies do not effectively address this issue. Adoption starts at the grass roots level and these physicians form the grass roots of the physician community.

It is well established that adopters of new innovations often learn by using the innovation [24,25] or reinvent the technology to adapt it to their own context [26,27]. The ability to share such user innovations and experiences are invaluable during the adoption of new technologies such as EMR. There are some online forums such as the Paperless Practice Groups that provide user support for EMR adoption issues, where users can share issues and problems while using the new technology and also help each other. Here we suggest that the availability of such diverse communication forums can enhance learning related to EMR deployment and lead to faster EMR adoption.

Social contagion and social cohesion theory could be used to further support the use of online forums and communities as a mode of communication that will effective for small practice physicians [28,29]. Social contagion theory states that when people come in the proximity of others who have adopted a particular innovation, there will be an enhanced tendency to adopt. The mere physical (or virtual) proximity transfers significant information regarding the innovation to the adoption laggard. Social cohesion theory, on the other hand, considers the social interaction between the adopter and the laggard. According to this theory, if there is more empathetic communication between the adopter and the laggard, then there is a higher chance of adoption of the innovation by the laggard. This has been proven in the in the classic adoption case of 'tetracycline' - where physicians embedded in interpersonal networks adopted this new medical drug at a faster rate than those who were not [28,29,30]. The tetracycline study shows that diffusion is a social process that requires interpersonal communication channels; more importantly, it shows the significance of peer-to-peer

communication for the adoption process of complex innovations. The autonomous nature of physicians often makes it difficult to get them to initiate peer-to-peer discussions about issues regarding technology adoption; however, social networks and virtual communities where they can read and participate in the discussions could provide a more open and less hierarchical environment for peer to peer interactions and knowledge transfer.

The establishment of 62 Regional Extension Offices through the 2009 HITECH act is a significant step forward in employing this kind of communicative approach. The objective of this program is to reframe the national issue of technology adoption, and facilitates dialogue on a regional level, thus allowing for unique barriers to adoption based on geography to be discussed. However, there is not much evidence as to whether they are reaching those goals on EMR information availability, as many regional websites (e.g. Alabama regional extension center - http://www.al-rec.org/content/ProviderAdvocacy which was opened sometime in 2010) do not even provide the required information for meeting the meaningful use criteria.

From the perspective of diffusing the need for EMR, programs such as these have multilayered benefits. First, placing physicians in the role of "leaders" allows them to become what Rogers (2003) [31] refer to as "change agents", or individuals who have the ability to influence the decisions of others. Even though the federal government is facilitating/funding this program, making physicians themselves the ones who are disseminating messages about technology adoption allows for the discussion of benefits and barriers to EMR to appear more authentic. Thus the physicians are the ones who can stir initial interest regarding technology, and then the federal government can serve their role in supplying tools to facilitate that process. Rogers (2003) advocated for this kind of diffusion strategy because interpersonal channels are more effective in stirring individuals to accept new ideas than when those discussions come from less respected sources [31]. Therefore, opportunities for peer-to-peer interactions can promote better learning and thereby improve adoption rates.

2.2. Online user forums as a facilitator of learning

An online user community/forum serves several purposes – a vehicle for collective learning, a vehicle for communication and socialization, a vehicle towards positive attitude change, a stage for knowledge creation and transfer. In order to increase technology adoption, potential users, i.e. those who are asked to adopt these new technologies, need to have a learning environment, so that they can acquire a better understanding of the technology.

According to Dodgson [32], "individuals are the primary learning entity in firms, and it is individuals which create organizational forms that enable learning in ways which facilitate organizational transformation". Knowledge is bound up with human cognition [33] and much of the knowledge is tacit as Nonaka and Konno [34] explain. Thus acquisition of such knowledge from physicians can prove to be very useful in understanding their resistance towards this new technology and also allow them to share their knowledge and collectively create something that they can make 'sense of' together.

This could also facilitate user-initiated innovations that promote adoption and continued use. When potential users are provided with enough support and help during the adoption process, they are also likely to experiment with the technology (or product) – i.e. playing around with it, discovering new ways of usage, and suggesting new ideas for improving the product (i.e. coming forward to co-create the technology with the vendor). This could be particularly useful in the healthcare industry since it is desirable for physicians who use these new technologies to come forward with suggestions and ideas for improving the technology and to share their experience (stories about technology use) with others.

Here, we first suggest that rich opportunities for physicians or small practice owners to interact with peers will enhance their learning associated with the technology (EMR) and thereby lead to enhanced level of adoption. We further suggest that physicians' participation in online forums (one such venue for interaction) will be positively associated with EMR adoption. An online forum could be invaluable in getting physicians to interact with other users and facilitate their learning. Finally, we also suggest that higher levels of peer support obtained by physicians regarding EMR technology and its use will be positively associated with EMR adoption. Thus, based on the above discussion, we propose the following three hypotheses.

Hypotheses 1: Opportunities to interact with other physicians or fellow office-based practice owners regarding EMR selection will be positively associated with EMR adoption

Hypotheses 2: Participation in online forums that facilitate peer-level interaction about EMR will be positively related to EMR adoption.

Hypotheses 3: Peer support from physicians in comparable practices regarding selection of EMRs or EMR vendors can positively impact EMR adoption

2.3 Relative significance of Economic incentives

The financial aspect of EMR adoption has been a pervasive impediment to their widespread use. While studies indicate that physicians would benefit by adopting and utilizing EMR, especially with regards to increased efficiency in patient care and billing services, these benefits are perceived as accruing only in the long term. The short term benefit or economic return for physicians for learning and adopting a new system has not been clear and there have been studies that show how physician productivity may be reduced by as much as 15% during the first three months of adoption [35].

Prospect theory [36] states that when making decisions individuals place more importance on immediate losses over long-term gains. EMR adoption presents a case study of this concept in action; as Hoffman (2009) has contended, physicians are wary of temporary losses because current incentive based structures provide no provisions for compensating lost revenue connected to EMR adoption [37]. These economic issues are compounded by the overall cost of implementing these systems. Boonstra & Broekhuis (2010) stated that the adoption of an EMR system can often cost upwards of $40,000 [38]. Despite these costs being more easily absorbed by large health care organizations, they are perceived as creating undue financial burdens for physicians working in either solo or small practices [39]. As a result, studies on EMR implementation have shown that physician adoption rates for fully functional systems (those that include information regarding pharmacies, laboratory reports, radiology results, medical history, clinical support and follow up data) are only at 4% [40].

To counteract some of these financial burdens, the federal government via the 2009 American Reconstruction and Recovery act, is offering physicians financial assistance for implementing EMR systems. Current incentive based structures offer physicians up to $64,000 in aid to purchase and adopt this technology within their practice. Despite these incentives addressing the surface costs of adoption, several "strings" attached to this aid have made

physicians still wary about complying. One contingency that is tied to government-issued incentives is a clause dictating how physicians need to integrate these systems into their practices. Physicians fear that the existence of this ambiguous "meaningful use" clause could possibly prevent them from receiving the funding they were promised, even if they utilized HIT in their practice [39].

Thus, given the above potential negative repercussions (and perceptions) related to financial incentives, we first suggest that peer support (and the associated learning) will have stronger impact than financial incentives on EMR adoption. Thus, the following hypothesis.

Hypotheses 4: Relative impact of peer support would be higher than the impact financial incentives on EMR adoption.

Financially-oriented issues are not just found in the "carrot" of incentive-based efforts, but also in the affiliated "stick." A goal of federally-sponsored EMR incentives is to boost US physician adoption rates to 90% by 2020 [3, 39]. To ensure that physicians are willing to utilize these incentives, the federal government will begin levying penalties onto noncompliant physicians starting in 2015. These penalties will come in the form of a progressive fine starting at one percent of a physicians' Medicare receipts and increase an additional one percent each year [41]. A noted problem with this kind of approach to HIT implementation is that research indicates that when a hardline approach to changing physicians' behaviors is implemented, the reaction is usually only emboldened resistance [42] and negative perceptions regarding EMR as well as regarding the enforcer – in this case, the government. Thus, based on the discussion, we suggest that economic penalties will likely have stronger impact than economic or financial incentives on EMR adoption. Thus, the following hypothesis:

Hypotheses 5: Economic penalties will have more impact on EMR adoption than incentives.

3. Method

Data was collected from small to large practice physicians across the country using an online survey questionnaire. The online survey was sent through local physician associations, national level healthcare professional associations, local network and online physician forums. The online forum from where we obtained most of the responses was the MGMA

(Medical Group Management Association). The local association that distributed our survey during one of their meetings is Medical Society of Northern Virginia. We also contacted local small practices and got them to fill out the paper surveys. There were two questionnaires – one for practices that have adopted EMR or are in the process of adopting EMR and one for those practices that haven't yet adopted EMR and do not have any plans in the near future to adopt EMR. The respondents were provided the option of picking the questionnaire based on their EMR adoption status. Further, here we considered the adoption of basic EMR.

Since this population set is difficult to reach and get response from, we offered $20 Amazon gift card for each response, if they provided their name and address at the end of the survey. The survey was anonymous and the part that collected the name and address were separate from the survey (the respondents had to click on a link that would lead to a separate page where they could provide their name and address). The responses on the survey were not in any way linked to the names and addresses provided. The call for participations also indicated that the respondents should either be an owner or stakeholder in the practice. Office managers who played an important decision making role regarding EMR adoption were also allowed to fill the survey on behalf of the physician owner.

The overall response rate for this study was difficult to calculate since the data was partly collected through an online forum, partly through direct calls to local small practices, and partly through a local physician association. In general, physician group is a very difficult population to reach and considering their lack of time and lack of interest in filling out surveys, the response rate for this group is considered much lower than in general population [43, 44]. Further, non-response bias is considered to be much less of a concern for the physician population than for the general population [43]. In addition, Web-based surveys have much lower response than postal or telephone surveys [44]. The web based portion of the data collection made it difficult to calculate the response rate for this study as there is a lot of variation in the nature of participation of the online community members – some check their emails daily, some less regularly, and others who provide emails addresses that they never monitor. In addition, it was sent as an email announcement, making it difficult for us to evaluate as to how many actually received/read our request.

4. Preliminary Results

We received 153 responses – 108 practices that have adopted EMR and 45 practices that have not adopted EMR. We are reporting our preliminary results here. Majority of the respondents were from small to medium practices – 63 respondents from small practices, 77 from medium practices and 11 from large practices. Majority respondents were from single specialty practices (83%). 34.6% respondents were from Primary care and 55.6% from Specialty care. In this sample, type of practice had statistically significant impact on EMR adoption. A mean comparison test (one-way ANOVA) showed significant differences between practices with EMR (WEMR) and without EMR (WOEMR) based on their type of practice. In this sample, 81.9% of primary care practices had adopted EMR. See table 1 for a profile of practices in this study.

Table 1: Data: Size, Scope, type of practice & location of the sample

	WOEMR	WEMR	Total
Size			
- Small	17	46	63
- Medium	24	53	77
- Large	3	8	11
Scope			
- Multispecialty	0	14	14
- Single specialty	36	91	127
Type of practice			
- Primary care	10	43	53
- Specialty care	31	54	85
- Urgent care	0	4	4
- Walk – in - clinic	0	1	1
- Concierge practice	1	0	1
Location			
- Urban	21	46	67
- Rural	4	27	31
- Suburban	11	10	21

Table 2: Regression: Impact of peer-to-peer interactions, online forums & peer support on EMR Adoption

Variables	Beta	t-statistic
Peer-to-peer interactions	0.232	2.787**
Online forums	0.162	2.133*
Peer Support	0.276	3.409**

n=152; standardized coefficients are reported
*p<0.05; **p<0.01

Table 3: Regression: Comparative impact of peer-to-peer interactions, online forums & peer support with government financial incentives on EMR adoption

Variables	Beta	t-statistic
Peer-to-peer interactions	0.248	2.993**
Online forums	0.170	2.253*
Peer Support	0.254	3.124**
Govt. financial incentives	-0.132	-1.884

n=153; standardized coefficients are reported
*p<0.05; **p<0.01

We conducted regression analysis to test the study hypotheses. The results indicate overall support for all the hypotheses. Hypothesis H1, H2, and H3 were all supported; H1 – peer to peer interactions (t=2.787, p<.05); H2 – peer support (t=3.409, p<.05); and H3 – online forums (t=2.133, p<.05) had statistically significant impact on EMR adoption.

To evaluate the relative impact of financial incentives with peer support, online forums and peer-to-peer interactions, we did a regression analysis with all the 4 variables – peer support, online forums, peer-to-peer interaction and financial incentives. The results show that, in this sample, government financial incentives did not have a statistically significant impact on EMR adoption. Both groups (practices with EMR and without EMR) had to indicate their financial sources for purchasing an EMR. Practices without EMR had to indicate their potential/anticipated sources for purchasing an EMR. In the current sample, government financial incentives were not a deciding factor in the adoption of EMR. This does not mean that financial incentives are not important, it just means that in this sample we did not find any correlation between practices those availed/needed financial incentives from the government and EMR adoption. This could be due to the fact that several practices that have adopted EMRs used out-of-pocket money and/or money provided by a hospital network. However, in this sample, government penalties (H4) was a big motivator in the adoption of EMR (t= 3.241, p<.05). Thus the final hypothesis was also supported.

5. Discussion and conclusions

The study results indicate strong support for the central study thesis that socio-behavioral and communication perspectives are equally (and sometimes more) important than government financial incentives in shaping EMR adoption. On the other hand, the recent trend clearly indicates a surge in EMR adoption after the financial incentives started rolling out. However, it has not been clear whether this surge is due to the financial incentives or due to the penalties that will be imposed for not adopting EMRs. While this study shows clearly that penalties are more powerful than incentives, we cannot conclude that there is no need for financial incentives. This could mean that practices that were financially better adopted EMRs earlier.

The most important contribution of this study is towards providing empirical support for factors derived from socio-behavioral and communication perspectives. User communities have been long used by high-tech companies to promote adoption and sustained use of complex technologies and this study indicate the importance of user communities in the healthcare technology adoption area as well. Further studies are required to understand what aspect of user community experience leads to adoption [45] and most importantly, studies that look into sustained use of EMRs by these small-medium practices as financial incentive induced adoption could pose problems later. One study recently found that small physician practices needed continued support and help to gain the returns of implementing EMRs [46]. Participating in user communities/forums can be useful not only during the adoption, but also for the sustained use of EMRs.

Future research could focus on the impact of user communities on sustained use of EMRs and on problem solving. It would also be particularly useful for understanding how to extract and use EMR data for clinical research – this area is an emerging research area as more and more practices adopt EMRs. Comparisons of organizational learning and adaptation in the context of EMR use between practices that have an online forum support vs. practices that do not have access to online forums can also be another valuable avenue for future research.

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