Diffusion and Use of Tethered Personal Health Records in Primary Care

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Abstract

Background: Personal health records (PHRs) enable patients to access their healthcare information in a secure environment, increasing patient engagement in medical care. PHRs can be tethered to a patient's electronic health record (EHR). Tethered PHRs, also known as patient portals, allow patients to access relevant medical information from their provider. Despite recent policy efforts to promote the use of health information technology and increased availability of PHRs in the clinical setting, PHR adoption rates remain relatively low overall. This article examines physician characteristics of high vs. low PHR adopters.

Objective: The objectives of this study were to (1) examine PHR use patterns in the primary care setting, (2) identify physician characteristics affecting PHR adoption, and (3) explore physician perspectives encouraging and deterring use.

Methods: Information technology records provided data on primary care patient portal use at a large Midwestern academic medical center. Electronic surveys were administered to affiliated primary care physicians to measure their perceived use of patient portals. A focus group consisting of physician providers who completed the survey was used to further elucidate the trends and perceived utilization of the patient portal in the clinical setting.

Results: While they expended significant time communicating with patients using the portal, physicians generally overestimated the time spent per week on the system. Physicians who had been in practice longer estimated a higher average time spent on the system when compared to newer physicians. Patient portal activation rates and use decreased with increased years in practice. During the focus groups, physicians voiced motivation to use patient portals because they perceived improved patient communication and satisfaction with use. However, continued lack of reimbursement for time spent in portal communication was reported as a major barrier to providers' engagement with this technology.

Discussion: Physician endorsement and engagement is critical to achieve widespread adoption of PHRs. Such endorsement can be obtained through (1) providing rewards from health system employers for high use of PHRs, (2) providing financial reimbursement for time spent electronically communicating with patients via the PHR from federal initiatives incentivizing meaningful use of health information technology, (3) building robust support staff assistance for PHR communication into primary care workflows, and (4) integrating more PHR-specific education into providers' EHR training.

Keywords: personal health records, patient portals, primary care, electronic health records, provider reimbursement

Background

Current healthcare policy trends are requiring providers to allow patients to have greater access to and control over their medical information. Personal health records (PHRs) have the potential to radically improve the efficiency and quality of healthcare. A 2008 study conducted by the Center for Information Technology showed that if 80 percent of the population were to use PHRs, the United States could save up to $21 billion annually.[1] The optimism surrounding PHRs was reflected in the Health Information Technology for Economic and Clinical Health Act of 2009, which allocated $25.9 billion toward the promotion and adoption of health information technology (IT), including the completion of a nationwide electronic medical record system.[2]

A subset of electronic medical records (EMRs), a PHR is defined as an "electronic application through which individuals can access, manage and share their health information, and that of others for whom they are authorized, in a private, secure and confidential environment."[3] Different forms of the PHR are currently employed in medical practice. PHRs may be "tethered" to the physician EMR, whereby PHR data are derived from subsets of information within the EMR; tethered PHRs are referred to as patient portals because they allow patients to access parts of their EMR. Alternatively, untethered PHRs are not tied to a specific EMR and may be Internet-based services in which the patient enters and maintains health information.[4] This article deals with use of a tethered PHR that allows communication exchange and information management with the patient's preexisting electronic health records.

By increasing patients' access to healthcare information in their medical record, PHRs aim to increase patients' engagement in their care through several means. PHRs provide a central portal through which patients may view personal health information including laboratory and diagnostic test results, medication lists, and allergy data. Patients can use tethered PHRs to correct inaccuracies and address omissions in the medical record. PHR-based electronic communication with providers may increase patient engagement and understanding of health problems, as well as increased frequency of feedback from providers on disease management (e.g., review of blood pressure or blood glucose values for hypertension or diabetes management).

PHRs facilitate patient–provider communication by allowing patients to send and receive electronic messages to and from physician offices. Such communication, when conducted as a supplement to office-based care, has been shown to improve control of several chronic diseases compared to traditional care models.[5-7] Improved communication with providers can improve quality of the provider–patient relationship.[8] PHRs can also increase administrative efficiency by permitting patients to schedule appointments and renew prescription medications.[9]

Patients with chronic conditions, frequent users of healthcare, and caretakers of elderly patients have been shown to express high interest in PHRs.[10] Despite increasing availability and interest in PHRs, adoption rates remain relatively low overall,[11] a finding that may be attributable to both patient and provider factors that may prevent widespread integration into the health information infrastructure.[12]

Patient barriers to widespread adoption of PHRs include (1) relative unfamiliarity and inexperience with using electronic PHRs;[13] (2) computer and health literacy, particularly among older patients;[14] (3) inadequate access because of limited provider participation;[15] and (4) special needs, including visual, cognitive, and physical limitations.[16] Overall, the majority of patients have endorsed Internet-accessible PHRs, with a minority of patients expressing strong opposition, which may be attributable to security and privacy concerns. Primary factors determining the extent of patient endorsement of PHRs include previous use of the Internet, number of expected benefits, and the ability to ask questions of physicians between visits.[17]

Low levels of physician awareness and familiarity with PHRs represented significant barriers that may prevent adoption and use.[18] In addition, other factors adversely affecting the adoption of PHRs among healthcare providers include (1) new workflow demands resulting from PHR use,[19] (2) general resistance to change,[20] (3) lack of technological literacy,[21] and (4) concerns relating to confidentiality and privacy.[22] In contrast to the support expressed by patients, physicians expressed more concern about the potential risks of PHRs, notably the potential for parts of the medical record to confuse patients.[23]

To achieve widespread adoption of PHRs, the beliefs and attitudes of physicians and patients toward PHRs should be reconciled. PHR endorsement and continual engagement by the physician are critical for widespread adoption.[24] In fact, aggressive marketing by the physician was determined to be the strongest predictor of patient PHR adoption.[25] These findings indicate that physician characteristics may account for use and perceived usefulness of the PHR system and may significantly influence PHR adoption rates.

The study site currently uses an EMR system that offers a PHR patient portal called MyChart to patients in the ambulatory clinics. MyChart enables patients to electronically communicate with providers via a secure messaging system and also allows patients to request renewal of prescription medications and to schedule appointments. In addition, MyChart allows patients to view components of their medical record, including medication lists, test results, medical history, and current health issues. All primary care physicians are required to offer this PHR to patients per departmental policy.

Objective

Currently, it is unclear how physicians integrate the use of the PHR into patient care workflows. This study seeks to (1) explore the current use of the tethered PHR in the primary care setting; (2) understand how physicians use the tethered PHR for clinical care, including comparing their actual use of the system and their perceived use of the system; (3) identify select physician characteristics that may influence PHR diffusion to patients; and (4) discuss strategies for increasing PHR distribution and use among patients.

Methods

Institutional Data and Electronic Surveys

IRB approval was obtained prior to initiation of the study.

The study relies on institutional data collected over 12 months (January–December 2011) by the IT department at the Ohio State University Medical Center that describe the utilization of the PHR. The data collected include metrics for the average hours logged into the PHR system, the quantity of patient e-mails sent, the total number of completed prescription requests, and the average number of new patient account activations per week. These data were collected on the physician and practice levels. The data were analyzed using descriptive statistics and through linear regression to assess trends and correlation. Differences in trends were tested using an unpaired Student *t*-test for statistical significance.

Institutional data were also collected on the patient users of the MyChart system. The data provided were aggregated by age groups and are used in this analysis to describe the distribution of users. The data included the number of patient users who were sent an activation code by a physician and the proportion of those patients who completed the activation process and used the MyChart system within the previous 12 months.

Electronic surveys were sent out to all primary care physicians affiliated with the Ohio State University Medical Center (OSUMC) who are subject to the departmental policy regarding MyChart use. The surveys asked physicians to estimate the average amount of time spent per week on MyChart activities, the average number of e-mails received by patients through MyChart, the average number of new activations of patient accounts, and the average number of prescription requests. Additionally, physicians were asked to rate aspects of the MyChart system including perceived usefulness, ease of use, technical support, and added quality to clinical care. Demographic and practice characteristics for each physician were also collected for use in the analysis. The physician responses were used to test for differences between perceived and actual usage using an unpaired Student *t*-test for statistical significance. To protect the privacy of the participants, all responses were anonymous.

Focus Group

Qualitative data were obtained from a semi-structured provider focus group consisting of four physicians. Physicians were recruited from the pool of providers who completed electronic surveys, but only four physicians agreed to participate in the focus group because of time and scheduling constraints. Focus groups were led by a primary facilitator and an assistant facilitator. Because the focus group was being recorded and transcribed for analysis, facilitators asked that participants refrain from using names or other titles during the discussion in an effort to maintain privacy. Any names that were used were omitted from the transcription. The focus group was used as an opportunity to further elucidate trends found in the analysis of provider survey data. The survey is used as the main data source, but the findings from the focus group helped contextualize the survey findings. Physicians were recruited by clinical site. Only practices that participated in the survey and had all site physicians agree to participate in the focus group would have a focus group. Only one practice met these criteria.

An audio recording of the focus group was transcribed using detailed transcription, which is a method that records not only verbal content but also conversational features such as pauses, stuttering, and interruptions.[26] This form of transcription helps capture emotions, such as enthusiasm and discomfort, in addition to content. Detailed transcription was performed to closely examine the content and meaning of the discussion and its implications for the use and implementation of MyChart. Study researchers discussed the format of detailed transcription before initiation of the study. Notes were also taken at the time of the focus group by the study coordinator.

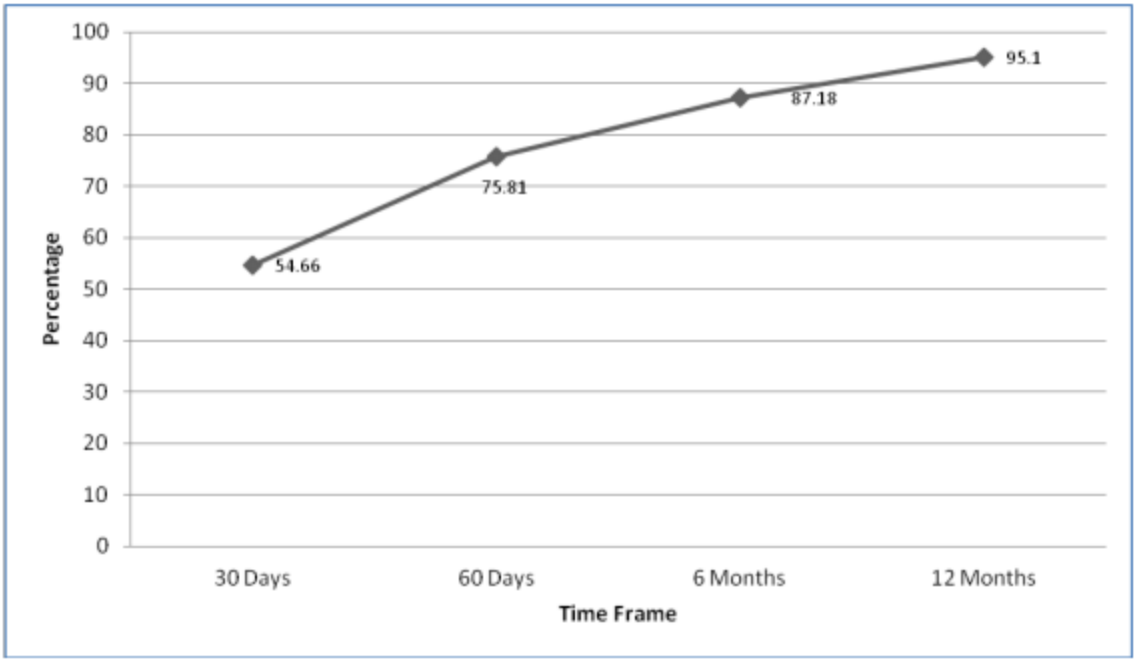
Transcripts were analyzed using the scissor and sort technique[27] for content. Two researchers identified provider discussion topics regarding MyChart use and associated comments. Each coded the transcript separately, and then the researchers came together to compare results from the independent coding. Discussion topics and comments identified by both researchers were summarized. A focused review of the scribe notes and tape was conducted to verify the accuracy of the detailed transcripts and to assess intonation.

Results

Institutional Data and Electronic Surveys

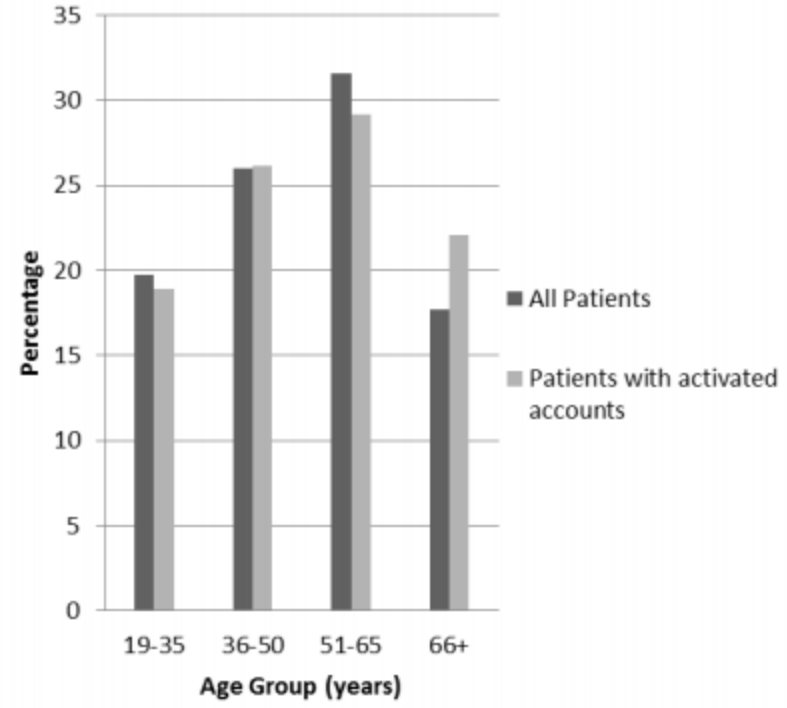
IT records show that patients who activate accounts for the OSUMyChart system become active users. IT records also show the proportion of all users who had logged into the MyChart system within 30 days, 60 days, 6 months, and 12 months from the time of the data pull. As seen in Figure 1, 54.66 percent of OSUMyChart users were active within 30 days of the data pull, and 95.1 percent of users were active within the 12-month period.

Figure 1: Percentage of Patients with Activated PHR Accounts Who Logged In Within 12 Months



The age distribution of the OSUMyChart users generally mirrored the patient population within the primary care clinics. The largest cohort of patients are the 51- to 65-year-olds, who make up 31.57 percent of the patient population in the OSUMC primary care clinics and 29.18 percent of OSUMyChart users, as seen in Figure 2. The cohort of patients age 66 years and older is the smallest cohort in the patient population (17.71 percent), but has a higher proportion of activated users than the youngest cohort, the 19- to 35-year-olds ($p = 0.032$).

Figure 2: Age Distribution of MyChart Users Compared to Distribution of Patient Population

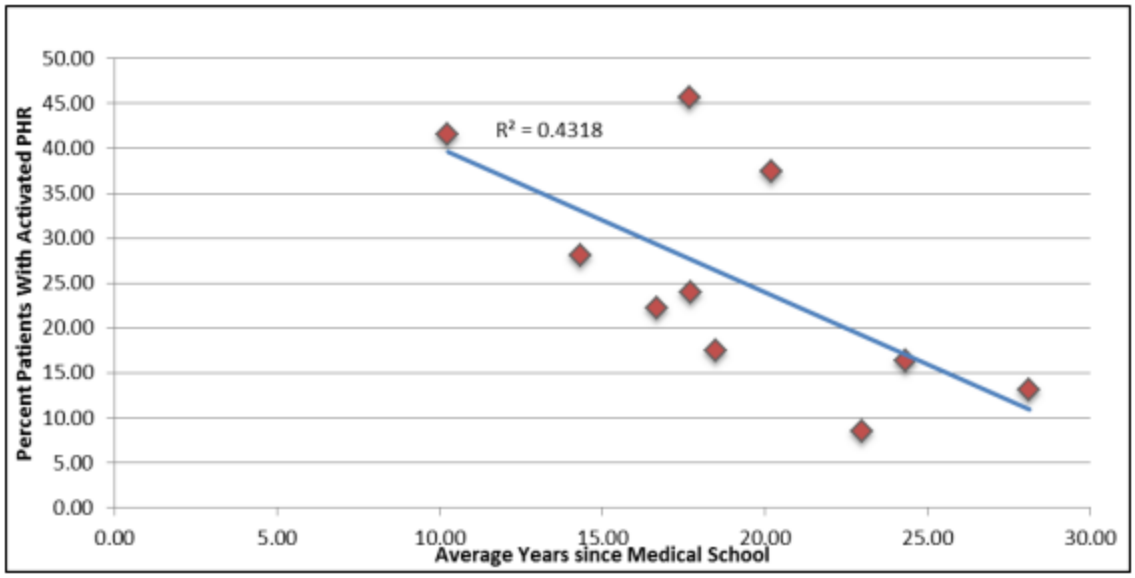


The provider survey was sent out to a total of 89 physicians. The response rate for this survey was 60.6 percent (n = 54). From the survey, physicians estimated spending an average of 12.5 hours per week logged into the OSUMyChart system; however, institutional records indicate an average of 8.2 hours per week (p = 0.034), as shown in Table 1. As a proxy for physician age, the number of years since medical school graduation was collected for each physician by the authors. Younger physicians have a higher average usage of the OSUMyChart system per week and also have more patients with activated accounts. (See Figure 3.) The correlation between physician age and the percentage of patients with activated accounts is -0.66.

Table 1: Comparison of Provider-Reported vs. IT Department-Reported Hours Logged into MyChart (n=54)

	Provider Self-Reported Estimate	IT Department-Reported Login Time
Average provider time spent on MyChart	12.5 hours/week	8.2 hours/week>
p=0.034		

Figure 3: Percentage of Patients with Activated Accounts for Physicians by Years Since Medical School Graduation



Note: Each point on the graph represents a practice of physicians. The average number of years since graduation from medical school for physicians within each practice was calculated and then plotted against the proportion of that practices' patients with an activated PHR

Focus Groups

The practice that participated in the focus group had younger physicians (all physicians had less than 20 years since medical school graduation). While providers expressed optimism regarding PHR use in office workflows, they raised concerns about the extra time commitment of attending to electronic communication and the lack of reimbursement for such communication. Notably, providers expressed that PHRs provide a means to supplement care and to increase patient engagement and satisfaction. However, providers felt that, because of the lack of reimbursement for this type of care, the PHR currently could only serve primarily as a supplement to face-to-face care. In addition, focus group discussion also revealed opportunities for office support staff to provide assistance in managing PHR communication. (See Table 2.)

Table 2: Provider Focus Group Comments on the Personal Health Record (PHR)

Topic	Comments
Benefits of PHR in current primary care workflows	1) "I think it helps some of the things we do. I think it's a time investment thing to make people more satisfied." (Patient satisfaction) 2) "So right now there's—the only big incentive to use it is to make people happy." (Patient satisfaction) 3) "I use it a lot in my depressed patients where I have them fill out a questionnaire when they're here, and then six weeks or four weeks from that visit I will program the system to send them that same questionnaire so I can compare the two. Now that's a very clinically useful use of the system." (Chronic disease management support) 4) "It's mostly patient initiated from my standpoint. If they need a refill, if they have a question, if they've got a concern, they email me." (Improved patient access) 5) "I think it has a lot of potential. We've looked at what percentage of our MyChart patients are younger verses middle age or older—it's almost equal across the board . . . a lot of our middle aged and older adults are using it very well, not just your 24-year old. So I think there's a lot of potential there." (Improved patient access)
Physician barriers to current PHR use	1) "I'll be honest, at the end of the day I care less about how much is reimbursed and more about how much time it takes." (Time burden) 2) "The best usage of MyChart is . . . because it's so poorly reimbursed and takes so much time, is . . . a supplement for your care in the office and not a replacement, because that appointment that they didn't get, someone else will get, and then I still have to do the care out of the office after that." (Poor reimbursement)

	3) “I have patients that [have started] months long conversations that we have in MyChart.” (Increased work) 4) “But it’s not well reimbursed and so it’s a matter of you know how much time are you willing or able to spend there too?” (Poor reimbursement) 5) “There is a lot of kind of you know logistical stuff that someone else in the office could handle that. Right now, everything just comes to me.” (Lack of assistance from support staff) 6) “So if it’s a supplement [for your care], fantastic. If it’s a replacement, it’s just going to end up consuming too much time.” (Lack of time)
Physician comments about incentivizing use	1) “I think, if it were reimbursed and we would get credit for the time—” “Yeah.” “—that would make the time we spend in the office [worthwhile].” (Financial reimbursement) 2) “I think the reimbursement is not necessarily about the money but just at the end of the day, we have to show that we’ve been busy all day. You know. And for us to say, ‘OK, you know, we’ve seen a certain number of patient volume, but then also like look what else we’re doing with our time.’ Just to show people that we’re not goofing off and [pause] eating bonbons.” (Getting credit for work) 3) “Maybe if it worked, you know, if the back and forth also included support staff so that there was some filter, and there was an active role by support staff and sort of filtering out what somebody else could answer and what you all could answer.” “Yeah, absolutely.” (Having access to adequate support staff)

Discussion

The Health Information Technology for Economic and Clinical Health Act of 2009 provides financial incentives for meaningful use of EMRs, including the adoption and use of PHRs by eligible providers. Despite federal initiatives, the literature reports a PHR adoption rate of 10 percent.[28] PHRs may greatly improve the efficiency and quality of care; however, these benefits will be unrealized without widespread adoption and use of this technology.

Among the factors contributing to patient-level adoption of PHRs, aggressive marketing by providers was identified as the strongest factor.[29] A prior study concluded that physicians may be indispensable to increasing adoption rates of PHRs,[30] and although PHRs are designed to benefit patients, any such benefit is dependent on the attitudes and actions of their healthcare providers. Our focus group discussion did reveal that positive attitudes toward usefulness of PHRs motivated the providers to use them despite inconvenience and lack of reimbursement.

The lower adoption rates of PHRs among older physicians may be attributable to the finding that providers are relatively unfamiliar with electronic PHRs and their associated benefits for patients and their medical practice.[31] Physicians’ lack of familiarity with this technology may limit their ability to endorse its use and therefore lead to lower adoption rates among patients. Studies show that adequate knowledge of a technology and its features is required for adoption and implementation.[32] Other studies indicate that healthcare providers have a limited understanding of PHRs and their functionalities.[33] The providers participating in the focus group did not voice such beliefs, but all had less than 20 years since graduation from medical school. Sampling an older population of physicians may have revealed technologic unfamiliarity.

Some education of healthcare personnel regarding how PHR functionalities can improve patient care and health outcomes is needed. Providing personnel with opportunities to learn more about PHRs will ensure that they have adequate knowledge of specific features within the system. Knowledge of specific features will allow providers to educate and encourage patients to make effective use of them and realize their benefits. A national survey of physicians suggested that to make effective use of PHRs, patients and their physicians must use them together.[34] A previous study further showed that at the level of medical student education, students exhibited a positive attitude toward key PHR functionalities and expressed optimism toward using them in the future. The study showed that future attitudes toward PHRs depended on the quality and the satisfaction derived from the educational experience, thereby highlighting the importance of education in improving PHR perspectives.[35] Training and education programs designed specifically for healthcare professionals, taking into account their individual learning preferences, will allow providers to obtain the knowledge necessary to educate their patients about PHRs. Such programs will facilitate the widespread diffusion of PHRs in the healthcare system.

While education may improve understanding of PHRs, it is not adequate to secure physician buy-in for use. Providers reported that they believed OSUMyChart was helpful to communicate with patients, but required extra time commitments. While

providers overestimated the amount of time that they spent using MyChart, they did expend significant time communicating with patients through PHRs every week (8.2 hours). Providers expended the equivalent of a complete workday communicating through PHRs, yet this communication remains mostly unreimbursed. In an environment where physicians are increasingly stressed by productivity demands, this model is not sustainable.

Time spent by physicians on MyChart communication may be partially reduced by models where qualified support staff, such as registered nurses, facilitate the bulk of patient messages. A previous study suggested that having a nurse serve as triage person, with healthcare providers given the option to respond to messages directly, would increase communicative efficiency.[36] However, the increased workload in communicating with patients electronically may be partially counterbalanced by increased workflow efficiency[37] and by improving communication in face-to-face visits.[38] In our study, providers expressed the desire for OSUMyChart to supplement, not replace, care. In fact, studies suggest that when used as a supplement, electronic messaging can improve the ease and quality of face-to-face communication between patients and providers.[39] The literature regards an increase in electronic communication positively, provided that regular patient visits are not compromised by this communication; however, the effect of PHRs on physician workload is currently unestablished,[40] and additional research is needed to closely examine the relationship. Such benefits of PHR communication were acknowledged by physician focus group participants and served as motivating factors for use.

An objective of meaningful use in 2015 is the continued increase in implementation and uptake of a secure messaging system through which patients may communicate with physicians. The primary benefits of a secure messaging system include improved continuity of care, reduction of healthcare cost, and a reduction in adverse outcomes.[41] Current federal initiatives arising from the Affordable Care Act financially incentivize meaningful use of PHRs in the clinical setting. The focus group discussion also demonstrated that a lack of reimbursement for electronic messaging was the major impediment to provider engagement of PHRs. Limited PHR-related billing codes may particularly affect physicians operating under a fee-for-service model.[42] While the increased workload in communicating with patients may be somewhat offset by increased workflow efficiency, financial reimbursement for the significant amount of provider time expended in these activities is imperative to ensure true meaningful use of this promising patient service.[43] A previous study indicated that 22 percent of messaging to physicians contained information sufficient to warrant reimbursement and that such communication with physicians may save one or more office visits per year.[44] As PHR use becomes more widespread, such reimbursable communication will likely increase. Incentivizing more robust PHR use through provider reimbursement may serve to reduce healthcare costs by reducing office visits. Providers may be more willing to address simple issues via PHRs rather than in an office visit if they are guaranteed some revenue for the communication.

This study demonstrates that physician characteristics may account for a large portion of variation in the perceived use and usefulness of the PHR system. Previous studies have shown that older physicians were significantly less likely to adopt EHRs[45] and that growth in PHR adoption is closely aligned with adoption of EMRs by primary care physicians.[46] Physician age correlated with adoption rates among the patient population but also with the relative use of the PHR among current users. Hence, evidence suggests that physician age, as defined by years removed from medical school, appears to have a significant impact on PHR adoption and use among patients.

With respect to EMRs, younger physicians, when compared to older physicians, are more likely to adopt this technology provided they had the experience and were comfortable using computerized applications.[47] Perceived ease of use, determined largely in part by a physician's comfort using computerized applications, is a major determinant of health IT adoption. Older physicians, who may have less experience working with computerized applications, may exhibit lower engagement of PHR technology. In addition, physicians who are not familiar with new technology are generally more resistant to change and more likely to adopt tools that are compatible with their current work processes.[48] This finding holds particularly true for older physicians, who may have busier practices and are therefore more sensitive to changes in clinical workflow. These findings implicate a need to develop strategies that are compatible with individual characteristics to increase provider engagement. Reimbursement that incentivizes the use of PHR secure messaging will improve workflow efficiency and therefore promote widespread adoption of PHR technology.

In addition, educational programs informing providers of the functionalities of the PHR system may have an immediate and substantial effect on PHR adoption when aimed toward older physicians. This proposal is consistent with the above finding that provider endorsement and engagement significantly affect PHR adoption and that providers with a positive outlook toward PHRs are more likely to promote PHR use.

Lastly, our study showed that older patients adopted PHRs to a greater degree than patients between ages 19 and 35 years. This finding may be due to increased comorbidities among older patients, which would increase the demand for PHRs and therefore PHR adoption rates in this age group.

Study Limitations

Certain characteristics of this study limit the generalizability of the findings. All participating physicians were from central Ohio, which may limit the transferability of the findings to other regions of the United States. Additionally, the relatively small number of focus group participants and the limited sample size of the electronic surveys further limits the generalizability of the results and implicates a need to conduct large-scale studies examining providers' views of the PHR and its integration into the workflow. Electronic surveys were administered to primary care physicians affiliated with OSUMC; however, further studies are needed to examine the use of PHRs in community-based and inpatient settings, and across various medical specialties. Academic affiliation and developmental policies regarding PHR use may have influenced physician perspectives and adoption rates of PHRs when compared to community-based settings. While physician age was determined to be a predictive factor in the diffusion of PHR technology, other characteristics such as race, gender, and technological proficiency may affect physicians' perspectives.

This study also explored physicians' use and perceived use of a tethered PHR in a primary care setting. Given the several types of PHRs, their use and perceived use will be dependent on their specific set of functionalities. Accordingly, use and usability vary by PHR system. MyChart has a specific set of functionalities that may not be representative of PHR systems elsewhere.

Finally, the focus group discussion, while informative, did not include a representative sampling of surveyed physicians (younger and older). The limited response to recruitment did not allow assessment of the saturation of concepts identified in the focus group. More diverse and numerous focus groups are needed to determine the generalizability of focus group concepts.

Conclusions

We anticipate that awareness and use of PHRs, an emerging technology; will continue to increase significantly in the near future, which will enable us to further characterize their use in clinical settings. PHRs increase patients' access to their healthcare information and therefore promote patient engagement in care. Despite their potential, adoption rates of PHRs remain relatively low overall, a finding due in part to a lack of provider endorsement and engagement of this emerging technology. The lack of provider endorsement and engagement may be due to demographic factors, including age; implications for physician workload; integration into clinical workflows; and lack of financial reimbursement.

Financial reimbursement for the time spent on electronic communication will incentivize meaningful use of the PHR and facilitate its integration into the clinical workflow. Moreover, educational and training programs at all levels of staffing positively shape provider attitudes and allow more meaningful staff support of PHR use. Such steps are instrumental in increasing providers' endorsement and use of this technology.

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