

Personal Health Record Use by Patients as Perceived by Ambulatory Care Physicians in Nebraska and South Dakota: A Cross-Sectional Study

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Abstract

The purpose of this cross-sectional study is to examine the awareness and engagement that ambulatory care physicians have with patients who use a personal health record (PHR). This is part of a larger study examining health information technology (HIT) and electronic health record (EHR) adoption by ambulatory care physicians in Nebraska and South Dakota. Descriptive results and inferential findings about physician awareness and engagement are presented in relationship to the physician's stage of EHR adoption, practice type and size, gender, specialty, and age. Overall, physicians' awareness of PHRs and their engagement with the technology remains low. Physicians using EHRs were more likely to be aware and engaged with PHRs than physicians who either plan to adopt EHRs or have no intention to adopt EHRs. Practice type, gender, and specialty have an association as well. The implications of the findings are discussed, and a recommendation is made that education of physicians is needed in this area as the nation progresses toward the creation of a national health information network for health information exchange.

Keywords: personal health record, health information technology, primary care, ambulatory care, physicians, patients, electronic health record, health information exchange

Introduction

Great social momentum has surfaced among the private healthcare sector, employers, the government, and consumers for a commonly accessible health record.^{1,2} The concept of having a patient's health records located only with the patient's health practitioner is changing. The patient's role has emerged as central, as the federal government-private health sector partnership works to build a nationwide health information network (NHIN) that will facilitate health information exchange among consumers and providers.³ Natural disasters such as Hurricane Katrina have brought the need for comprehensive and longitudinal personal health information access to the forefront of our social agenda. Electronic health records (EHRs) within the provider environment are essential. Furthermore, a complete record that integrates both the provider's EHR and the consumer's health information is needed. This record is emerging as the personal health record (PHR).

The PHR is an "electronic, lifelong resource of health information needed by individuals to make health decisions. Individuals own and manage the information in the PHR, which comes from healthcare providers and the individual. The PHR is maintained in a secure and private environment, with the

individual determining rights of access. The PHR does not replace the legal record of any provider.”⁴ The PHR has the potential to become a single record that reflects all the healthcare a patient has received throughout his or her life.⁵ Consumers believe the PHR allows ready access to and use of “credible” personal health information, enabling healthcare providers to gain easier access to patient information and open channels of communication with other healthcare providers and entities.^{6,7} According to a Harris Interactive poll, 42 percent of U.S. adults surveyed said they keep some form of a personal health record.⁸ Overall, the PHR facilitates consumers becoming active participants in their healthcare decisions.⁹

Healthcare providers, employers, organizations, and government entities also want consumers to use PHRs. Healthcare providers want access to a patient’s aggregated health record to enhance their own abilities to accurately and comprehensively treat and monitor the patient.¹⁰ This enhanced availability of information can also reduce medical care costs.¹¹ Employees who keep track of their health are likely to be healthier and have decreased absenteeism.¹² Some large employers, such as Wal-Mart, Intel, Applied Materials, BP America, and Pitney Bowes, have set up PHRs for their own employees.¹³ Government entities view the PHR as another step toward increasing health information exchange between patients and providers of healthcare.¹⁴ The Centers for Medicare and Medicaid Services and the U.S. Secretary of Health and Human Services both support the development of PHRs because of the great potential for improved safety and quality of healthcare overall.¹⁵ Currently, Veterans Administration patients are able to access their personal health records, called Personal Health Journals, through HealtheVet, an online service linked to the VistA electronic health record system.¹⁶

Although there is much optimism about the value and gains of PHR adoption, there are emerging challenges as well. Some of these include concerns about security, privacy, and seamless integration of policies and procedures that facilitate exchange; provider accessibility to a complete health record; time and resource challenges posed by maintaining and using such a system; and variation in consumers’ abilities to use PHRs.¹⁷ It is anticipated that PHR use will increase as more patients become aware of its potential.¹⁸ This awareness is also being promoted by health information management organizations such as the American Health Information Management Association (AHIMA) and the American Medical Informatics Association (AMIA), which encourage individuals to keep their own complete PHR.

The imminence of PHR adoption by consumers and integration of the PHR into the EHR movement is apparent. Physicians will be the primary and leading health professionals in the movement toward optimal use of the PHR and engagement with consumers about their personal health information. There is a need to understand the present level of awareness and engagement of ambulatory care physicians with patients who maintain personal health records.

Purpose

The purpose of this study is to describe the awareness and engagement that ambulatory care office-based physicians in Nebraska and South Dakota have with patients who maintain personal health records. Physicians’ perceptions of their patients’ PHR use is also described. Potential relationships between physician awareness and engagement with patients who use PHRs and physician age, gender, practice type and size, specialty, and EHR adoption status are explored.

Methods

A cross-sectional survey titled “Enhancing Clinical Practices through the Adoption of Health Information Technology” was developed and distributed to ambulatory care physicians in Nebraska and South Dakota in late 2007. The exploration of personal health record awareness and engagement was part of a larger study conducted to explore the use of various forms of health information technology used by ambulatory care physicians. A focus on the stage of adoption of EHRs served to guide the overall inquiry, with physicians divided into three groups: those who use EHRs (“users”), those planning for EHR use (“planners”), and those with no plans to implement EHRs (“nonplanners”). The survey instrument contained 106 items exploring a variety of health information technology topics: electronic health record adoption and use, personal health records, use of technology for various patient care activities, feelings

about technology, and technology infrastructure, among others. Respondents did not have to complete all 106 items, as the instrument branched according to the respondent's reported stage of EHR adoption. Items in the branched sections assessed factors for EHR adoption, EHR functionality, and security and privacy concerns associated with health information exchange. Items were presented in a multitude of formats, including yes/no questions, Likert scales, fill-in-the-blank responses, and open-ended questions. This paper focuses on the components of the survey that are related to the personal health record. Survey items were specifically designed to determine physician perceptions about their patients' use of PHRs and how physicians and their practices engaged with patients who use PHRs.

Participants. The health professions licensure databases maintained by the states of Nebraska and South Dakota were the primary record sources used to identify potential ambulatory care physician respondents.^{19, 20}

Survey instrument development. The survey instrument was developed by both adapting the items from previously published research surveys that explored electronic health record adoption and developing new items that were not addressed by these previous studies.²¹⁻³² The exploration of the PHR was an area of new survey item development because it was not studied in previously published surveys.

Survey distribution. The survey was distributed using a modified Dillman technique over an eight-week period.³³ Potential participants were sent a letter of invitation followed by the survey itself. A reminder postcard was followed by a second survey mailing to nonrespondents. A second reminder card was then sent, followed by a third survey mailing to nonrespondents.

Data analysis. Results were aggregated and then stratified by stage of EHR adoption, age, gender, practice type and size, and specialty. There were very few missing responses, with less than 1 percent of individual item responses missing. The researchers used a traditional method of replacing missing data with a proxy value by predicting the likely value based upon similar question responses given by the respondent in related areas and imputing that value to the missing value. If the consistency of a proxy value with other responses provided could not be verified, that data element was left missing. Descriptive analyses were conducted to describe the physician awareness and engagement with patients who use PHRs. Differences were determined between physician awareness and engagement with patients who use PHRs and the categories of EHR adoption, gender, practice type and size, and specialty using chi-square tests. Point-biserial correlation ($r_{pb} > 0.2$) was performed to determine if there is a significant relationship between physician awareness and engagement with patients who use PHRs and the physician's age. The significance level was set at $p < 0.05$ for all statistical comparisons.

Results

There are 6,886 licensed physicians in the states of Nebraska and South Dakota. American Medical Association (AMA) data indicate that 4,334 of these physicians maintain an ambulatory care practice.³⁴ All physicians in both states were asked to self-identify if they maintained an ambulatory care practice and, if so, to complete the survey. A total of 955 physicians responded with complete surveys for an overall ambulatory care physician response rate of 22 percent. Although this may be classified as a low response rate by traditional standards, the survey was distributed to 100 percent of physicians in both states. Thus, the data gathered represent 22 percent of all ambulatory care physicians in Nebraska and South Dakota.

The demographic distribution of the ambulatory care physicians is 26.2 percent female, with a mean age of 50 years. The AMA at the state level reports 24.1 percent female and a mean age of 50 years, which is consistent with the data. The distribution of the state-level data for responders and nonresponders is the same for age and gender of the physicians who were studied. The distribution by practice type is 54.0 percent free-standing, 23.0 percent medical group, 3.3 percent federally qualified health center, 7.1 percent medical school, 5.7 percent rural health clinic, and 6.9 percent other. The distribution of physicians by specialty is 32.5 percent general/family practice, 7.9 percent internal medicine, 7.9 percent pediatrics, 7.5 percent obstetrics/gynecology, and 44.2 percent ambulatory care specialty physicians. The distribution of respondents by practice size is 28.0 percent with two or fewer physicians, 39.8 percent with three to seven physicians, and 32.2 percent with eight or more physicians. There is no standard

method for reporting physician practice sizes. The distribution of subjects by these demographic characteristics is similar to the national data generated from the AMA work force statistics on physicians in the United States.³⁵

The results are reported both in the aggregate and separately for the two states. For some findings there are state differences; however, the trends in the overall responses were similar.

Overall Results

The findings related to physicians' PHR awareness and engagement are reported in Table 1. Their perceptions about patients' PHR use are reported in Table 2.

Awareness of PHRs by physicians. A quarter of responding physicians were not familiar with PHRs. The majority (59.5 percent) did not know if any of their patients used PHRs, 12.3 percent indicated that some of their patients used PHRs, and 29.6 percent indicated that none of their patients used PHRs.

Engagement of physician practices with patients who use PHRs. Very few physicians indicated that they use information the patients provide through a PHR during patient care (5.1 percent). Even fewer have a staff member work with patient PHRs (4.2 percent) or can electronically integrate patient PHR information into their own professional record (3.4 percent). The number of respondents reporting engagement is so small that no statistical test for potential differences at the state level was performed.

Physicians' perceptions about their patients' use of PHRs. Despite this apparent lack of PHR knowledge and use, physicians are observing patients keeping track of their own personal health information. Almost all respondents (91 percent) reported observing patients bringing in a written list of the medications they are taking, and 81 percent reported observing patients keeping a written list of their conditions/disease states. This has been a long-standing tradition of patients who want to inform their physicians of their complete list of medications from all prescribers. Almost half (46.6 percent) of respondents reported seeing patients maintain a PHR in paper form. However, very few respondents reported seeing patients keep a PHR on a personal digital assistant (PDA) (4.2 percent), Web site (2.4 percent), or smart card (2.1 percent). Overall, the average percent of patients that physicians estimate keep a PHR in any media form was 17.8 percent. This included 84.3 percent of patients keeping a PHR on paper, 7.6 percent on a PDA, 4.3 percent through a Web site, and 3.8 percent on a smart card.

Results Stratified by EHR Status

EHR status. The distribution of physicians who responded in each of the EHR adoption categories was 29.7 percent EHR users, 51.9 percent who planned to implement an EHR system, and 18.5 percent who did not plan to implement an EHR system. The findings related to physicians' PHR awareness and engagement stratified by EHR status are reported in Table 3. Physicians' perceptions about patients' PHR use stratified by EHR status are reported in Table 4.

Physician awareness of PHRs and patient PHR use. Nonplanners reported decreased awareness of PHRs compared to planners (23.5 percent) and users (22.3 percent): 30.6 percent of nonplanners were not familiar with PHRs. Nonplanners were also unfamiliar with their patients' PHR use (64.2 percent), compared to planners (61.4 percent) and users (53.2 percent). There was a statistically significant difference detected between the groups ($\chi^2 = 6.747, p = 0.034$). Physicians reported a similar lack of PHR use by patients regardless of EHR status. In contrast, there was a sizable difference in physicians who reported that some of their patients used PHRs: 18.0 percent of users reported that some patients used PHRs, compared to 12.0 percent of planners and 4.0 percent of nonplanners.

Physician and staff PHR use. Only 6.8 percent of users reported using the information patients entered into their own PHRs, and only 6.5 percent of users reported that a member of their staff works with patient PHRs. These numbers were even lower for planners (5.4 percent and 3.9 percent) and nonplanners (1.7 percent and 1.2 percent). However, a statistically significant difference between groups was detected for staff working with patient PHRs ($\chi^2 = 7.724, p = 0.021$). Additionally, there is a strong contrast between the rate of PHR integration into EHRs for users (7.9 percent) compared to the rates for nonplanners and planners (1.2 percent and 1.4 percent, respectively). Physicians were instructed to

respond to this question based on the electronic system present, even if it was not a true EHR. These differences were significant ($\chi^2 = 26.238, p = 0.000$).

Use of written lists compared to PHRs. Nonplanners had the highest percentage of patients who kept a written list of medications (93.6 percent) and patients who kept a written list of conditions/disease states (85.5 percent), followed by planners (91.5 percent and 82.5 percent) and users (91.0 percent and 78.8 percent).

Various PHR media use. Electronic PHRs were utilized most by patients of EHR users compared to patients of planners and nonplanners. Users reported that 5.8 percent of patients used a PHR on a PDA, compared to 4.1 percent of planners and 2.3 percent of nonplanners. Users also reported that 5.8 percent of their patients used a Web-based PHR, compared to only 1.0 percent of planners and 0.6 percent of nonplanners. Finally, users reported that 2.9 percent of patients used a smart card PHR, versus 2.1 percent of planners and 1.2 percent of nonplanners. The fourth media category, PHR in paper form, had the highest utilization by patients of planners (49.1 percent), followed by patients of users (45.3 percent) and patients of nonplanners (43.9 percent).

Online PHR use. There is a sizable difference in how physicians observe patients keeping track of personal health information through a Web site. EHR users report that 5.8 percent of their patients keep personal health information using a Web site. However, only 1.0 percent of planners and 0.6 percent of nonplanners observe patients using a Web site to track personal health information.

Results Stratified by Gender

A greater number of male physicians (32.9 percent of males vs. 20.4 percent of females) perceive that none of their patients use PHRs ($\chi^2 = 13.846, p = 0.000$). Yet, more male physicians than female physicians reported using the patient's PHR information (6 percent vs. 2.8 percent, $\chi^2 = 3.780, p = 0.052$), having a member of their staff work with the patients and their PHRs (5.2 percent vs. 1.2 percent, $\chi^2 = 7.537, p = 0.006$), and being capable of electronically integrating PHR information into their own EHR (3.5 percent vs. 2.8 percent). Female physicians reported observing more of their patients carrying a written list of conditions/disease states compared to male physicians (86.8 percent vs. 79.6 percent, $\chi^2 = 6.381, p = 0.012$). No other differences were found between male and female physicians.

Results Stratified by Practice Type

Physicians in rural health clinics most often indicated that they had never heard of PHRs (35.2 percent), while federally qualified health center physicians most frequently indicated that none of their patients used PHRs (37.5 percent, $\chi^2 = 11.878, p = 0.018$). These same physicians most frequently reported being aware of their patients' use of PHRs (62.5 percent, $\chi^2 = 16.146, p = 0.003$). Though physicians in federally qualified health centers may see fewer patients keeping track of their health information, more of them report being able to electronically integrate PHR information into their EHR (9.4 percent). They also reported the lowest number of patients keeping either a paper list of medications (87.5 percent) or a paper list of conditions/disease states (71.9 percent, $\chi^2 = 20.137, p = 0.000$).

Physicians in all practice types reported at least 40 percent of their patients maintaining a paper PHR. However, physicians practicing in a medical school setting reported high numbers of patients using electronic forms of PHRs compared to physicians in other practice types. This includes personal health records on a PDA (4.4 percent), a Web site (5.9 percent), and a smart card (2.9 percent). Medical school physicians reported using patient information obtained through a PHR more often than physicians in any other practice type (10.3 percent).

Results by Practice Size

Physician-reported use of PHRs was examined in relation to the practice size. Physicians' responses about PHR use were analyzed as a subset. These responses were compared to practice size by rank order. A visual inspection of the data revealed no pattern or relationship. This is probably attributed to a low number of physicians reporting engagement with PHR use, such that no obvious pattern has yet emerged. The consumer-driven nature of PHR use is also a possible reason for the fact that no relationship between practice size and responses was observed.

Results Stratified by Specialty

Physicians identifying their specialty as general pediatrics reported using PHR information less (2.7 percent) than their counterparts in general/family practice (6.1 percent), internal medicine (6.6 percent), or obstetrics/gynecology (5.6 percent). Only 1.3 percent of pediatricians reported having a member of their staff work with patient PHRs compared to general/family practice physicians (4.5 percent), internists (5.3 percent), and ob-gyns (4.3 percent). Fewer pediatricians than physicians in any other primary care category perceive that patients bring a written list of medications (80.0 percent) or conditions/disease states (61.3 percent, $\chi^2 = 17.521, p = 0.001$), or report having patients that bring PHRs in paper form (36.0 percent, $\chi^2 = 14.758, p = 0.002$), on a PDA (4.0 percent), through a Web site (0 percent), or on a smart card (1.3%).

Results by Age

No relationship was found between age and physician awareness or engagement with patients and PHR use ($r_{pb} < 0.2, p > 0.05$).

Discussion

Many physicians (25 percent in this study) are unaware of what a personal health record is. It is possible that physicians are unfamiliar with the term but familiar with the concept. However, this survey did provide a definition and brief explanation, so the results suggest that the respondents have not been introduced to the concept. Nearly 60 percent of physicians also are not aware if any of their patients use a PHR. There is a clear gap between reported use by patients and perceptions of patient PHR use by physicians. One explanation for this disparity is that staff members may enter information into the patient's chart and do not document where the information came from. Patients may also not be sharing their PHR use with their physician, and consequently physicians may not be asking about patients' PHR use. This may explain why physicians reported that 17.8 percent of their patients keep a PHR, compared to the Harris Interactive poll that found that 42 percent of patients report keeping a PHR.³⁶

Substantially more patients are maintaining PHRs in electronic form than their physicians are aware of. Yet, almost all physicians report that their patients continue to provide them with paper lists of medications and conditions/disease states. These high percentages indicate that patients realize the importance of maintaining their own health records and also think it is important to share that information with their providers. However, patients may find that their physicians are not responsive to the sharing of information through technology. As a result, they provide the physician with paper records. This is one possible explanation for the disparate findings between paper records and electronic PHR recognition by physicians relative to their patients. As patients become more involved in their healthcare through developing written lists of medication use and disease states into more formal PHRs, it seems reasonable to posit that they will expect physicians to involve them more in care decisions and to be able to exchange health data. Physicians that encourage more patient-provider interaction through PHRs and other newer technologies may find themselves in higher demand.

Respondents for all stages of EHR adoption reported similar numbers of patients who keep a PHR in paper form, with EHR planners having the highest rate (49.1 percent). The optimism of planners may be in effect here, as they may be encouraging patients to keep paper records for future expansion into PHRs, but may refrain from emphasizing the use of electronic media since PHRs are not yet easily integrated into EHRs. Since physicians who are EHR users reported greater awareness of PHR use by their patients compared to physicians who are not planning to use EHRs, we might surmise that physicians favoring HIT use may be encouraging patients to maintain PHRs. If they are not encouraging PHR use, physicians may still be paying more attention to their patients' engagement with the PHR as a health technology. It is also important to keep in mind that only 7.9 percent of EHR users are able to electronically integrate PHR information into their EHRs. As the technology for PHR integration continues to expand, it is possible that physicians will be encouraged to further develop their use of PHR information. Additionally, the lack

of awareness of PHRs by nonplanners compared to planners and users suggests that there may be a link between PHR and EHR use. Since nonplanners were less aware of PHRs, it follows that fewer nonplanners would report knowing if any of their patients use a PHR compared to planners and users. Nonplanners may be less knowledgeable about PHRs and thus less likely to inquire about patients' PHR use.

Based on the data presented for PHRs based on EHR status, we surmise that there will be an eventual move to electronic PHRs, rather than paper-based records. Users observe fewer patients keeping a written list of medications or conditions/disease states and more patients keeping track of information either on a PDA, through a Web site, or on a smart card. As more providers adopt EHRs, it stands to reason that this shift from paper to electronic-based records will continue as well. This is further supported by the provision of PHRs to consumer employees by such companies as the Cleveland Clinic and Blue Cross/Blue Shield of Massachusetts (both partnered with Google Health).^{37, 38} As more organizations begin to embrace the use of PHRs, it will also gain more widespread acceptance. This support is important as many feel that PHRs will only progress as EHR interoperability becomes more refined. It is argued that the lack of universal EHR implementation is one of the biggest barriers to integrated PHR adoption.³⁹

Regardless of EHR adoption status, the number of respondents who say they use the information patients enter into their PHR is low (1.7 percent vs. 5.4 percent vs. 6.8 percent). The low rates of PHR integration by physicians may also be caused in part by concerns about security and privacy of information. A study conducted for the Office of the National Coordinator for Health Information Technology concluded that existing privacy policies are incomplete in terms of standards, clearly defined terms, and other appropriate rules and regulations.⁴⁰ Another study conducted by HIMSS Analytics on various health organizations revealed that 13 percent of respondents had a security breach in the previous 12 months.⁴¹

The observed differences between gender in this study are in contrast with what has previously been described in the literature. Studies of cultural differences in current medical practice have demonstrated that with respect to practice style, males (the predominant physician population) tend to engage and communicate less with patients.⁴² However, this study indicated that male physicians displayed a stronger awareness of patient PHR use than female physicians.

Federally qualified health centers may observe fewer patients keeping track of their health information and using PHRs because of the patient population they serve. These patients may be more likely to have a history of mental illness and/or substance abuse, making them unlikely candidates to maintain accurate records of their health. This finding also raises issues of how patients with cognitive or physical disabilities or low levels of computer, reading, or health literacy will utilize PHRs. However, for those patients who do keep PHRs, federally qualified health centers are more likely to be able to electronically integrate that information into their EHRs. This is likely due to the system that has been implemented in the Veterans Affairs Medical Centers, which are federally qualified health centers.

It is encouraging to note that no practice type reported less than 40 percent of patients keeping a PHR in paper form. This finding further illustrates what has been suggested in the literature: that patients are becoming more involved in their healthcare. Medical school physicians report more of their patients utilizing electronic PHRs. We may also be witnessing an early emergence of these technologies into the medical school setting first, with increased utilization rates in other practice types to follow. As medical school physicians have greater access to patient health information through different media, they appear to be more open to using this information.

Pediatricians report observing fewer patients using a PHR and less use of patient PHR information compared to other specialties. Intuitively, it would seem that pediatricians should observe more patients keeping track of their health information (i.e., diligent parents keeping track of their children's information); however, that is not consistent with our research findings. It is possible that pediatricians may have interpreted "patient" to be the child and did not take into account parent records that were kept for the child.

Limitations

We did not address physician attitudes regarding the use of PHRs. Thus, our discussion merely poses possible reasons for the current level of physician PHR awareness and engagement. However, it makes intuitive sense that physicians who are working with more advanced health information records, that is, EHRs, are likely to have more familiarity with PHRs and experience with patients who have PHRs. Familiarity is a key component to technology diffusion into general use. The interdependence of PHRs on EHRs from the viewpoint of data exchange and system interoperability is worth further exploration.

Detecting the emergence of use of a new technology throughout a population is temporally sensitive.⁴³ We are likely studying the phenomenon of PHR awareness and use in practice by physicians at a very early stage of technology diffusion into the medical practice culture. We would expect that in the next year or two, a substantial increase in awareness and integration of patient PHRs into medical practices will be observed.

Implications for Future Research

Based on prior literature and the results of this study, it is clear that there is an emerging need for a future research agenda regarding personal health records in the areas of interoperability, technology development, awareness, alignment of policy, and technology access. Furthermore, standards need to be developed in order for a central repository of information to be created. The Certification Commission for Healthcare Information Technology (CCHIT) has formed a PHR Work Group to begin developing certification standards for PHRs.⁴⁴ Integrated PHR-EHR systems like the one being utilized at the Palo Alto Medical Foundation (PAMFOnline) need to be further examined in order to determine the most effective method of information and technology integration.⁴⁵

Once standards are created, HIT developers will need to produce PHR and EHR systems that are applicable across a wide variety of health professions. Each system is very profession-specific. Currently, a pharmacy system looks very different from a physician system, and these differences will need to be addressed in order to advance health information exchange.

Providers and patients must become more knowledgeable about the use of PHRs and their potential impact on healthcare and patient safety. Programs need to be developed in order to provide comprehensive education about PHR use and its place in the health information exchange movement.

Five key areas that must have policy alignment include infrastructure and technology readiness, economics, health information technology applications, user and consumer acceptance, and legal and privacy concerns.⁴⁶ Efforts to align economic policies that support the average consumer and security and privacy policies that support the personal values of the consumer are key areas of focus for the PHR.

If PHRs move to being predominantly Web-based, patients and providers who do not have Internet access will become disadvantaged. Also, PHRs have been touted as a major boon in the event of a natural disaster like a hurricane.⁴⁷ However, a severe natural disaster would likely result in lack of Internet access, making Web-based PHRs unusable during this period. Currently, Web-based PHRs appear to be the most readily accessible to consumers as compared to PDAs and smart cards. These situations require further examination.

Conclusion

Personal health records are one of the newest health information exchange technologies. The potential for PHRs to contribute to improved quality of care, reduced healthcare costs, and further empowerment of patients as central to their own healthcare is great. Despite the value, this study illustrates the overall lack of awareness and engagement of ambulatory care physicians with patients who use PHRs. As the nation moves forward in building the national health information infrastructure, it is imperative that physicians, other health professionals, and patients be educated on the potential that PHRs have and how to engage in their use.

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Table 1

Physician Awareness and Engagement with PHRs by EHR Status—Overall Responses

	Nebraska (<i>n</i> = 612)	South Dakota (<i>n</i> = 343)	Overall (<i>n</i> = 955)
I have never heard of Personal Health Records	167 (27.3%)	72 (21.0%)	239 (25%)
Physician Awareness of Patient PHR Use			
I do not know if any of my patients use PHRs	386 (63.1%)	182 (53.1%)	568 (59.5%)
None of my patients use PHRs	190 (31.0%)	93 (27.1%)	283 (29.6%)
Some of my patients use PHRs	93 (15.2%)	24 (7.0%)	117 (12.3%)
Physician Engagement with Patient PHRs			
I use the information my patients enter into their own PHRs	44 (7.2%)	5 (1.5%)	49 (5.1%)
A member of my staff works with my patients' PHRs	31 (5.1%)	9 (2.6%)	40 (4.2%)
I can electronically integrate PHR information into my EHR	20 (3.3%)	12 (3.5%)	32 (3.4%)

	Nebraska (<i>n</i> = 612)	South Dakota (<i>n</i> = 343)	Overall (<i>n</i> = 955)
List of medications on a paper record	558 (91.2%)	315 (91.8%)	873 (91.4%)
List of conditions/diseases on a paper record	518 (84.6%)	260 (75.8%)	778 (81.5%)
Personal Health Record—in paper form	333 (54.4%)	112 (32.7%)	445 (46.6%)
Personal Health Record—on PDA	32 (5.2%)	8 (2.3%)	40 (4.2%)
Personal Health Record—access to a Web site	17 (2.8%)	6 (1.7%)	23 (2.4%)
Personal Health Record—smart card	18 (2.9%)	2 (0.6%)	20 (2.1%)

Table 3

Physician Awareness and Engagement with PHRs by EHR Status

	Nonplanners (n = 173)	Planners (n = 486)	Users (n = 278)	p-value
I have never heard of PHRs	53 (30.6%)	114 (23.5%)	62 (22.3%)	0.105

Physician Awareness of Patient PHR Use

I do not know if any of my patients use PHRs	111 (64.2%)	298 (61.4%)	148 (53.2%)	0.034
None of my patients use PHRs	51 (29.5%)	150 (30.9%)	79 (28.4%)	0.770
Some of my patients use PHRs	7 (4.0%)	59 (12.0%)	50 (18.0%)	0.000

Physician Engagement with Patient PHRs

I use the information my patients enter into their own PHRs	3 (1.7%)	26 (5.4%)	19 (6.8%)	0.055
A member of my staff works with my patients' PHRs	2 (1.2%)	19 (3.9%)	18 (6.5%)	0.021
I can electronically integrate PHR information into my EHR	2 (1.2%)	7 (1.4%)	22 (7.9%)	0.000

	Nonplanners (<i>n</i> = 173)	Planners (<i>n</i> = 486)	Users (<i>n</i> = 278)	<i>p</i> -value
List of medications on a paper record	162 (93.6%)	445 (91.5)	253 (91.0%)	0.593
List of conditions/diseases on a paper record	148 (85.5%)	401 (82.5%)	219 (78.8%)	0.173
Personal Health Record—in paper form	76 (43.9%)	238 (49.1%)	126 (45.3%)	0.422
Personal Health Record—on PDA	4 (2.3%)	20 (4.1%)	16 (5.8%)	0.207
Personal Health Record—access to a Web site	1 (0.6%)	5 (1.0%)	16 (5.8%)	<i>a</i>
Personal Health Record—smart card	2 (1.2%)	10 (2.1%)	8 (2.9%)	<i>a</i>

a. This chi-square analysis had at least one cell with an expected frequency less than 5.