Patient-Perceived Facilitators of and Barriers to Electronic Portal Use
A Systematic Review

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This systematic review describes characteristics of portal users and their perceptions of this emerging technology. Recent empirical evidence (2010-2016) was reviewed to answer three questions: (1) What are the characteristics of electronic patient portal users? (2) What are patient-perceived facilitators of electronic patient portal use? (3) What are patient-perceived barriers to electronic patient portal use? Characteristics of portal users are described according to three broad categories: demographic characteristics, patterns of use, and complexity and duration of disease. Three themes were found related to patient-perceived facilitators of use: provider encouragement, access/control over health information, and enhanced communication; two themes were found related to patient-perceived barriers to use: lack of awareness/training and privacy and security concerns. Understanding a patient's perception of technology is paramount in optimizing use. These insights will allow for development of better products and clinical processes that facilitate broad goals of improved use of information technology. Policy and practice implications are discussed, as well as suggestions for future research.

KEY WORDS: Electronic health record, Patient electronic access, Patient engagement, Patient portal, Personal health record

Electronic patient portals (EPPs) are Web-based accounts that patients can use for access to data from their electronic health record (EHR). Access to basic information including visit summaries and medication lists is common; in many cases, more advanced patient-oriented functions such as secure messaging, access to educational resources, and appointment scheduling are available via portal.[1] The purpose of this systematic review is to synthesize findings describing EPP users and their perceptions of this emerging technology. Portal use has grown dramatically in recent years as the result of national efforts to advance health information technology. The Health Information for Economic and Clinical Health (HITECH) Act and Medicare Access and Children's Health Insurance Program Reauthorization Act (MACRA) of 2015 have resulted in requirements for healthcare providers to attest to objectives that demonstrate meaningful use of this technology.[2,3]

MEANINGFUL USE

The driving force behind expanded portal adoption is the federal EHR incentive program. The EHR incentive program, also known as meaningful use (MU), was designed by the Centers for Medicare and Medicaid Services (CMS) to encourage adoption, implementation, and use of EHRs to improve patient care. Attestation to MU requires eligible providers to meet a set of objectives that evolve in three stages with increasing requirements. Eligible providers were first able to attest to MU stage 1 in 2011. After 3 consecutive years of meeting stage 1, providers were able to advance to stage 2 criteria. The earliest a provider could meet stage 2 was 2014.[4] As of September 2016, more than 509 000 healthcare providers have received more than $23 billion in incentive payments for participating in the MU program.[5]

In addition to incentives offered for providers who choose to attest to MU, the program also includes penalties for nonparticipation. Medicare eligible providers who did not demonstrate MU were subject to a 1% penalty beginning in 2015. The payment reduction increases each year an eligible provider does not demonstrate MU, to a maximum of 5%. Approximately 209 000, or two in five, providers eligible for the MU program received a 2% penalty in 2016, which equates to approximately $600 million.[6]

On March 30, 2015, the proposed rule for MU stage 3 was published in the Federal Register. The CMS received more than 2500 comments on the proposed rule, many of which contained stark criticisms of the MU program from

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key stakeholders such as the American Medical Association and the American Hospital Association.[7] Lack of flexibility and payment adjustments were the basis for much of the criticism received. As the result of this feedback, CMS revised the timeline for implementation and made stage 3 requirements optional in 2017 and required by 2018. Beginning in 2018, all providers will report on the same definition of MU at stage 3 regardless of prior participation.[4]

MEDICARE ACCESS AND CHILDREN'S HEALTH INSURANCE PROGRAM REAUTHORIZATION ACT

On November 4, 2016, the Department of Health and Human Services issued a notice of final rulemaking pertaining to implementation of key provisions of MACRA of 2015. This legislation repeals the Medicare sustainable growth rate methodology and replaces it with a new approach to payment called the Quality Payment Program. The Quality Payment Program authorizes CMS to measure performance through a new Merit Based Incentive Payment System (MIPS). By the end of 2018, the MU program will be phased out and replaced with MIPS as authorized by the MACRA legislation. The MIPS program is similar to MU in that providers will be eligible for incentive payments or will face downward payment adjustments based on their participation. However, unlike MU, the new program is designed to offer greater flexibility and focus more on improved patient care. Providers will select measures that best fit their practice from objectives that emphasize patient engagement and information access via the EPP.[6]

The health information technology landscape is evolving at a rapid pace with much uncertainty surrounding sustainability. The EPP is no longer a feature of convenience but rather a necessary tool that can be used to empower and engage patients in their healthcare. While providers may be motivated in the near term by incentive payments, long-term benefits of the EPP may include enhanced quality, efficiency, and cost-effective coordinated care.[8] Despite recent studies linking the EPP to improved outcomes (ie, care coordination, building trust between patient and provider, more frequent office visits, expanding access to care), patient use of this technology remains low.[9] As providers continue working to enhance their use of this technology, it is important to understand portal users and how they perceive the EPP. This review addresses a gap in the literature because no previous reviews were found focusing on exploring user characteristics and patient perceptions.

OBJECTIVE

The aims of this article are to describe portal users and to discuss patient perceptions of the EPP. As providers continue to expand their rates of adoption and scope of portal technology, it is important to understand patient-perceived facilitators

and barriers to increase patient engagement via the EPP. Three questions were formulated to guide the systematic review of scientific literature:

1. What are the characteristics of EPP users?
2. What are patient-perceived facilitators of use of the EPP?
3. What are patient-perceived barriers to use of the EPP?

METHODS

Because of advances in technology as the result of the HITECH act, this review was limited to studies published between 2009 and November 2016. Pre-HITECH patient portals lack modern design and functionality, making a poor comparison with post-HITECH portals. A search was conducted in the databases CINAHL, PsycINFO, and MEDLINE-PubMed using different combinations of search terms related to patient portals, patient engagement, patient perceptions, and EHRs. The search was limited to empirical studies in the English language published in peer-reviewed journals. The initial search yielded 163 publications (see Figure 1). After eliminating duplicates and screening titles, abstracts, and
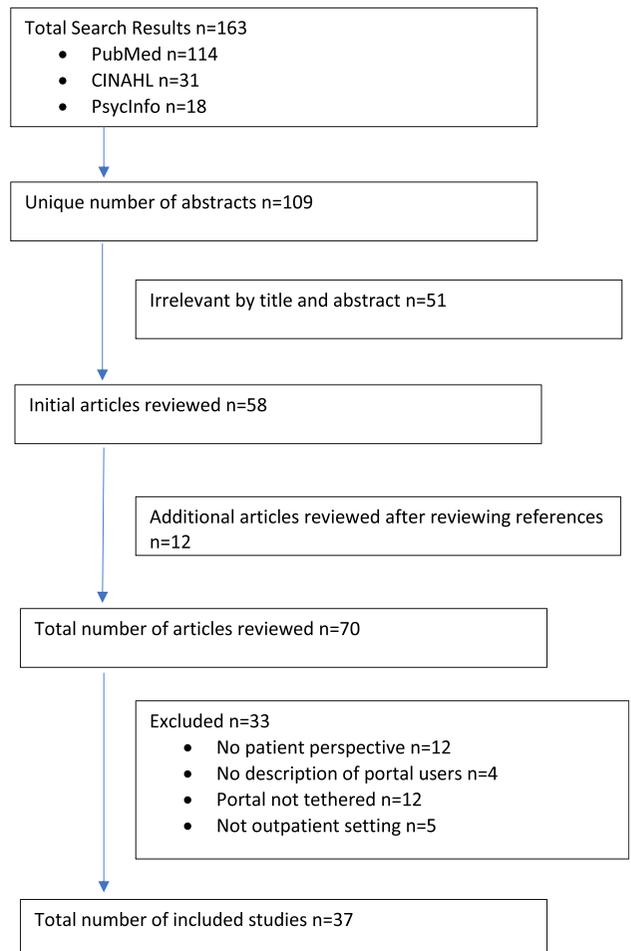

FIGURE 1. Flow chart of process of systematic literature search.

keywords, the search was reduced to 58 publications. All studies were reviewed for scientific rigor, and reference lists were scanned to identify additional studies relevant to this review. After review of reference lists, 12 additional publications were reviewed, bringing the total to 70. A total of 33 studies were excluded because they did not include the patient's perspective as an outcome variable, did not describe portal users, were not used in an outpatient setting, or used a portal that was not tethered to the EHR. Thirty-seven studies were included in the final review (see Table 1).

RESULTS

Of the 37 studies included in the final review, nine used qualitative methods, 22 were quantitative, and six used mixed or multiple methods. Thirty of the studies were conducted in the United States, while the remaining eight were conducted in countries such as the United Kingdom, the Netherlands, and Finland.

Characteristics of portal users are described according to three broad categories: demographic characteristics, patterns of use, and complexity and duration of disease. Three themes were found related to patient-perceived facilitators of use: provider encouragement, access to/control over health information, and enhanced communication; two themes were found related to patient-perceived barriers of use: lack of awareness/training and privacy and security concerns.

Portal Users

Most studies included in this review (n = 19) sought to describe portal users according to a variety of characteristics. Specific characteristics and outcomes measured varied considerably from study to study; therefore, results were organized according to three broad categories: demographic characteristics, patterns of use, and complexity and duration of disease.

Demographic Characteristics

Demographic variables were used to compare portal users with nonusers in 16 studies. Age, sex, and race were the most commonly explored demographic variables. In all but one study that used age as a variable to predict portal use, younger patients were more likely to use a patient portal compared with older patients.[12,14,15,19,23,24,26,31,37,42] Sex was another commonly explored demographic variable used to compare portal users with nonusers. Multiple studies found that female patients were more likely to be portal users compared with male patients.[12,14,20,23,26] Racial differences resulted in significant differences in portal users in six studies. All six examined differences in portal use according to race and found white users to be more likely than nonwhites to use a portal.[12,16,19,25,26,28]

In addition to age, sex, and race, other demographic characteristics were found to have noteworthy associations with portal use. Insurance type was included in two studies, which both found portal users to be more likely to have private insurance.[16,28] Osborn and colleagues[28] conducted a study to explore how the portal could be used to improve medication management and adherence support in adults with type 2 diabetes. They found that portal users were more likely to have private insurance and higher levels of education compared with nonusers. Similar findings were revealed in a study among parents of children with asthma in which portal users were more likely to have private insurance and more severe asthma and to be taking more medications compared with nonusers.[16]

Patterns of Use

Two studies included in this review attempted to describe portal users, not only in terms of demographic characteristics but also by patterns of use. To describe both types and patterns of portal users, Jones et al[22] conducted a quantitative study using a sample of patients with cardiovascular disease or diabetes (N = 2282). Findings revealed the most prevalent user groups among this sample were patients who spent a short amount of time in the portal, those who had infrequent but intense use, and those who used a specific function of the portal such as electronic messaging or appointment scheduling. Overall, portal users were found to be highly heterogeneous in their patterns of use with a clear gap in understanding the link between portal use and patient outcomes.

Similarly, Schneider et al[33] identified different parent groups according to coping style and use of a patient-controlled EHR in the United Kingdom. Semistructured interviews with parents of children with chronic illness revealed four different use patterns: collaborating, cooperating, avoiding, and controlling. The patient-controlled EHR met the needs of parents from the controlling group (defined as approach oriented and highly motivated to use the patient-controlled EHR) and the collaborating group (approach oriented and motivated to use the patient-controlled EHR) more than the needs of the cooperating group (avoidance oriented, less motivated) and the avoiding group (very avoidance oriented, not motivated). The differences in patterns of use according to coping style have important implications for designing future systems to meet patient needs. Patients do not all respond in the same way when provided access to health information, and consideration of basic needs such as autonomy, competence, and relatedness must be taken into account.[33]

Complexity and Patterns of Disease

Variables related to complexity of disease, time since diagnosis, and office visit rates were included in several studies. In three studies, patients who used the portal were more likely to have complex care needs requiring more frequent office visits compared with nonusers.[12,16,24] Higher rates of portal

Table 1. Summary of Systematically Reviewed Articles Describing Portal Users and Perceptions

Author	Country	Method, Sample Size, Population	Theory	Portal Users[a]	Perceived Facilitators of Portal Use[b]	Perceived Barriers to Portal Use[c]
Alpert et al[10] (2016)	United States	Multiple methods; interviews and focus groups with patients (n = 31) and clinicians (n = 13)	None		2, 3	1
Ancker et al[11] (2015)	United States	Quantitative; telephone surveys of outpatients (N = 180)	Patient activation			2
Ancker et al[12] (2011)	United States	Quantitative; patients from federally qualified health centers (N = 74 368)	None	1		
Black et al[13] (2015)	United States	Qualitative; focus groups with outpatients (n = 21) and providers (n = 13)	Grounded theory		1	1, 2
Buist et al[14] (2014)	United States	Quantitative; adult patients (N = 332 381)	None	1, 3		
Cho et al[15] (2010)	United States	Quantitative; outpatient veterans with diabetes (N = 201)	None	1	2	
Fiks et al[16] (2016)	United States	Mixed methods; parent surveys (n = 237), semistructured parent interviews (n = 22), clinician focus groups (n = 10)	None	1, 3	3	1
Fiks et al[17] (2014)	United States	Qualitative; interviews of parents of children with asthma (n = 7); focus groups with parents and providers (n = 51)	None		2, 3	
Gee et al[45] (2015)	United States	Qualitative; interviews with patients with chronic illness (N = 15)	Grounded theory		2, 3	1
Gerber et al[19] (2014)	United States	Quantitative; portal users with cancer (N = 6495)	None	1		
Goel et al[46] (2011)	United States	Quantitative; outpatients (N = 159)	None			1
Goel et al[42] (2011)	United States	Quantitative; outpatients (N = 7088)	None	1		
Graetz et al[20] (2016)	United States	Quantitative; patients with chronic conditions (N = 1041)	None	1		
Heyworth et al[21] (2014)	United States	Mixed methods pilot study; veterans (n = 60)	None	1	3	
Jones et al[22] (2015)	United States	Quantitative; outpatients with CD or DM (N = 2282)	None	2		
Jung and Padman[23] (2014)	United States	Quantitative; outpatients (n = 2512)	None	1		
Ketterer et al[24] (2013)	United States	Quantitative; pediatric primary care patients (N = 84 015)	Patient activation	1, 3		
Latulipe et al[18] (2015)	United States	Qualitative; interviews with patients (n = 36) and caregivers (n = 16)	None		2, 3	2
Lyles et al[25] (2013)	United States	Quantitative; patients with DM (N = 11 518)	None	1	3	
Mikles and Mielenz[26] (2014)	United States	Quantitative; patients of federally qualified health centers (N = 42 317)	None	1	1	
Mishuris et al[27] (2015)	United States	Qualitative; veterans receiving home-based primary care services (N = 14)	Grounded theory			1
Osborn et al[28] (2013)	United States	Mixed methods; focus groups and chart reviews of adults with DM (N = 75)	None	1		1
Phelps et al[29] (2014)	United Kingdom	Quantitative; outpatients (N = 11 352)	None		1	
Pillemer et al[30] (2016)	United States	Mixed methods; patient records (n = 14 441), patient and provider interviews (n = 13)	None		2	

(continues)

Table 1. Summary of Systematically Reviewed Articles Describing Portal Users and Perceptions, Continued

Author	Country	Method, Sample Size, Population	Theory	Portal Users[a]	Perceived Facilitators of Portal Use[b]	Perceived Barriers to Portal Use[c]
Riippa et al[43] (2014)	Finland	Quantitative; patients with chronic illness (N = 876)	Patient activation	3		
Riippa et al[44] (2014)	Finland	Quantitative; patients with chronic illness (N = 222)	Patient activation	1, 3		
Roelofsen et al[31] (2014)	NLD	Quantitative; patients with DM (N = 2674)	None	1, 3		
Ronda et al[32] (2014)	NLD	Quantitative; patients with DM (N = 12 793)	None		1	1
Schneider et al[33] (2016)	United Kingdom	Qualitative; field study with patient families (n = 16) and pediatric providers (n = 11)	Theory of Coping and Self-Determination Theory	2	3	1
Tieu et al[34] (2017)	United States	Qualitative; interviews of patients with chronic disease and caregivers (N = 25)	None			1
Turvey et al[35] (2014)	United States	Quantitative; veterans (N = 18 398)	None		2	1
Urowitz et al[36] (2012)	Canada	Qualitative; interviews of patients with DM (N = 17)	None		2, 3	1
van der Vaart et al[37] (2014)	NLD	Quantitative; patients with arthritis (N = 360)	None	1		
Wade-Vuturo et al[38] (2013)	United States	Mixed methods; focus groups and surveys of patients with DM (N = 39)	None		1, 2	2
Wright et al[39] (2014)	United States	Quantitative; outpatients (N = 2289)	None		2	
Zarcadoolas et al[40] (2013)	United States	Qualitative; focus groups with low-education patients (N = 28)	None		2, 3	2
Zan et al[41] (2015)	United States	Quantitative; patients with HF (N = 21)	None		2	

Abbreviations: CD, cardiac disease; DM, diabetes mellitus; HF, heart failure; NLD, the Netherlands.

[a]Characteristics of portal users: 1, demographics of portal users; 2, patterns of portal use; 3, complexity and duration of disease.

[b]Perceived facilitators of portal use: 1, provider encouragement; 2, access to/control over health information; 3, enhanced communication.

[c]Perceived barriers to portal use: 1, lack of awareness/training; 2, privacy and security concerns.

use were also found in patients who had been given a diagnosis of a chronic disease within 1 year.[31,43] Conflicting evidence was found pertaining to office visit rates and portal users. While Ketterer et al[24] found portal users to have more office visits compared with nonusers, Riipa and colleagues[44] found nonusers of the portal to have more office visits. In addition to an increased number of visits, the timing of the office visit was found to affect portal use. Buist et al[14] examined use of the portal among early adopters and found that those who had recently had a well-patient visit were more likely to be portal users.

Patient-Perceived Facilitators of Use

Understanding patient-perceived facilitators of portal use is a necessary prerequisite to establishing a link between portal use and improved patient outcomes. Patient-perceived facilitators of portal use include provider encouragement, having control of and access to health information, and enhanced communication.

Provider Encouragement

Patients whose provider encouraged them to use the portal, for either a specific task or general use, perceived this as a stimulus for portal use.[13,26,29,32,38] Patients who received individualized instructions regarding use of the portal from a provider were more likely to use specific features such as secure messaging.[26,38] Phelps et al[29] found provider encouragement and assistance with the first login resulted in improved use of the portal after 3 years. This result is especially noteworthy because most studies in this review used cross-sectional data and did not study variations of portal use across time.

Access to/Control Over Health Information

Perceived access to and control over personal health information was found to be a facilitator of portal use in 12 studies included in this review.[10,15,17,18,30,35,36,38–41,45] Patients value the convenience and immediate access to their health

information and report feelings of empowerment and increased engagement when this information is readily available.[40,45] While perceived improvements in engagement are important, even more noteworthy were patient perceptions of the portal as a tool for improving confidence in self-management activities.[36,40,45] These results suggest potential in using portal technology to engage patients in self-care and disease self-management.

Another important finding related to patient perceived access/control was the patient's ability to identify and correct errors. Findings from multiple studies revealed that patients recognize the importance of error correction in the EHR via the patient portal and value the opportunity to avert a potential safety event.[17,30,39]

Enhanced Communication

Enhanced communication between patient and provider was identified as a common patient-perceived facilitator of portal use.[17,18,21,25,33,36,40,45] In one study, the potential for enhanced communication was identified as the most important feature of the portal.[45] Using the portal to enhance communication has important implications for the patient-provider relationship. Lyles et al[25] hypothesized that patients who used the portal would have enhanced communication and trust in their providers. Findings revealed a positive association between trust and being a registered portal user.

The portal offers an additional channel of communications, which is perceived by patients as enhancing access to their providers. Patients reported that secure messaging, available via the portal, improved access to the provider, especially between in-office visits. Patients reported this expanded access as contributing to more efficient and higher-quality face-to-face visits because patients could keep their provider informed of changes that occurred between visits.[38]

Patient-Perceived Barriers to Use

The synthesis of findings from studies included in this review reveals two themes related to patient-perceived barriers to portal use: lack of awareness of the portal and privacy and security concerns.

Lack of Awareness/Training

A lack of awareness of the portal was the most consistent perceived barrier to portal use; in fact, it was the main reason patients identified for not using the portal in six studies.[13,27,28,32,35,45] Six additional studies included reports of patients who felt that they were not given sufficient training or instructions regarding use of the portal.[10,16,33,34,36,46]

Ronda et al[32] conducted a study to identify perceived barriers to portal use among patients with diabetes. Patients with a login (n = 1500) were compared with patients who had no login (nonusers) (n = 3000). Among patients without

a login, not knowing the portal existed was the reason 72.4% of the respondents indicated that they did not use the portal. Turvey et al[35] surveyed patients who were registered users of the portal and compared patients who actively used it with those who did not. Of the total sample (N = 18 398), 33% were current users, and 63% had never used the portal. When nonusers were asked the reason they did not use the portal, 61.3% said that they were not aware that it existed.

A lack of awareness of the portal was also found in two qualitative studies. Black et al[13] conducted focus groups consisting of patients with asthma in a low-income urban setting to explore portal use. Findings revealed that lack of awareness of the portal was the main barrier to portal enrolment. Similarly, Mishuris et al[27] conducted semistructured interviews (N = 14) with patients receiving home-based care to identify barriers of portal use. Patients stated that they did not know about the functionality of the portal or how to gain access. These findings are especially noteworthy because these patients had acknowledged being mailed a flyer or seen a poster about the portal yet perceived a lack of awareness. Furthermore, when asked how they would like to learn more about the portal, most were enthusiastic about having a provider describe its functionality and how it might benefit them personally.

Privacy and Security Concerns

Privacy and security concerns were perceived to be another barrier to portal use.[11,13,18,38,40] Zarcadoolas et al[40] conducted focus groups with low-education patients from New York City (N = 28) to identify their perceptions regarding use and value of a patient portal. Privacy concerns were raised in three of the four focus groups. Participants voiced concern regarding their health information being compromised by hackers and password security. Similar privacy concerns were noted in a qualitative study of low-income patients with asthma (N = 21) wherein patient distrust of technology and the threat of identity theft were perceived as barriers to use. Despite these concerns, participants seemed willing to accept the risk of security breach for the benefit of a convenient and accessible health record.[13]

DISCUSSION

The aims of this literature review were to describe portal users and to discuss patient perceptions of the EPP. Understanding the patient's perception of this technology is a necessary prerequisite to future work aimed at optimal use. Understanding why and how patients use electronic portals will allow for development of better products that facilitate broad goals for improved use of information technology. Ultimately, patient demand for portal features perceived as useful will be necessary to achieve widespread portal adoption and realization of potential benefits.

The MU incentive program is currently the primary driver of portal functionality and adoption; however, the program has been criticized for lacking emphasis on outcomes and a one-size-fits-all approach to effective use. Stages 1 and 2 of the MU program included a number of objectives focused on increasing patient access to health information. Stage 3 objectives place continued emphasis on access but also include a focus on patient-centered communication for care planning and care coordination through patient engagement.[4] While the changes proposed under MACRA, namely the MIPS, continue to focus on improving engagement via the portal, the proposed rule does not address long-term sustainability of the EPP once the incentive program is expired. To continue to use this technology to improve access, contain cost, and improve patient-centered care, we must consider future needs of both patients and providers and develop ways to evaluate this technology.

A consistent limitation noted throughout this review was the lack of theoretical framework and inconsistent conceptual definitions. For healthcare providers to track success of the EPP and evaluate specific functions, concept development is necessary. Many studies in this review identified "portal use" as the outcome variable; however, I would argue that use is multidimensional and should be considered beyond simply the number of logins. While most studies included in this review defined portal use by the number of logins, there are other important characteristics of use to consider. Variability in the frequency of use over time, consistency of use, and specific features or functions used can provide insight into opportunities for enhanced use of this technology.

The conceptual model for understanding the link between portal use and changes in patient outcomes is not adequately developed and must be improved to identify appropriate outcome measures and to test more robust hypotheses. Correlations among portal use, behavior change, decreased resource use, improved quality of care, cost containment, medication adherence, and patient satisfaction are only some of the possible outcomes that need to be considered in future research. Development of a conceptual framework that allows for the testing of robust hypotheses must be conducted to advance the science related to portal use and salient outcomes.

Several studies in this review found that patient and provider perceptions of the portal are correlated and interdependent.[13,25,26] Patients want their providers to encourage and explain to them how to use the portal, as well as provide multiple opportunities for training. Despite this desire, providers are not adequately exposing and training their patients to use the portal. Lack of awareness of the portal was the most common patient-perceived barrier to use.

Another important finding from this review is that patients are more likely to use the EPP when they are encouraged to do so by their providers. Simply providing patients with assistance for their first login was found to be strongly associated with being a persistent user even after 3 years.[29] Incorporation of the EPP into provider workflow is a pivotal step toward developing sustainable and relevant use. Workflow processes must be developed so that providers do not feel that the EPP is a hindrance but rather an asset to their practice.

The EPP use has potential benefits for both patient and provider. Portal use has been found to build trust between the patient and the provider, encourage more frequent office visits, and expand access.[24,25] Expanded access to the provider is critical especially in rural areas and in areas where providers are in short supply. These findings are significant as we continue to refine and expand portal features and improve use; however, none of these benefits will be realized if providers do not train patients to use the portal and do not have the information necessary to analyze outcomes. A clear gap in knowledge exists in regard to the most effective training processes that are least disruptive to the clinical workflow and result in long-term portal users.

CONCLUSIONS

Understanding portal users and their perceived facilitators and barriers for using the EPP is important to realize the benefit of this emerging technology. Variations in demographics, patterns of use, and the complexity and duration of disease were found to differentiate portal users from nonusers. In addition, this review revealed important facilitators of use such as provider encouragement, having access to and control over health information, and enhanced communication. Barriers to portal use identified by this review include concerns regarding privacy of personal health information and, perhaps more significantly, a lack of awareness or training to use the portal. Further research is needed to understand educational strategies currently being used by providers and interventional studies to determine which strategy is most effective at encouraging persistent and productive EPP use. In addition, further development of a conceptual framework is necessary to identify appropriate outcome measures associated with persistent portal use.

References

1. Griffin A, Skinner A, Thornhill J, Weinberger M. Patient portals: who uses them? What features do they use? And do they reduce hospital readmissions? *Applied Clinical Informatics*. 2016;7(2): 489–501.
2. US Department of Health and Human Services. HHS finalizes streamlined Medicare payment system that rewards clinicians for quality patient care. https://www.hhs.gov/about/news/2016/10/14/hhs-finalizes-streamlined-medicare-payment-system-rewards-clinicians-quality-patient-care.html. Accessed October 17, 2016.

3. HealthIT.gov. Index for excerpts from the American Recovery and Reinvestment Act of 2009. https://www.healthit.gov/sites/default/files/hitech_act_excerpt_from_arra_with_index.pdf. Accessed April 19, 2016.

4. Centers for Medicare and Medicaid Services. Electronic health record (EHR) incentive programs. https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html?redirect=/ehrincentiveprograms. Accessed October 17, 2016.

5. Centers for Medicare and Medicaid Services. Medicare incentive payments: EHR incentive program. http://www.healthcareitnews.com/blog/future-meaningful-use-stage-3. Accessed October 17, 2016.

6. Pittman D. 209,000 doctors hit with meaningful use penalty this year. http://www.politico.com/tipsheets/morning-ehealth/2016/01/politicos-morning-ehealth-209-000-doctors-hit-with-meaningful-use-penalty-this-year-212129. Accessed October 17, 2016.

7. Halamka J. The future of meaningful use stage 3. http://www.healthcareitnews.com/blog/future-meaningful-use-stage-3. Accessed October 17, 2016.

8. Goldzweig CL, Orshansky G, Paige NM, et al. Electronic patient portals: evidence on health outcomes, satisfaction, efficiency, and attitudes: a systematic review. *Annals of Internal Medicine*. 2013;159(10): 677–687.

9. Shimada SL, Brandt CA, Feng H, et al. Personal health record reach in the Veterans Health Administration: a cross-sectional analysis. *Journal of Medical Internet Research*. 2014;16(12): e272.

10. Alpert JM, Krist AH, Aycock RA, Kreps GL. Applying multiple methods to comprehensively evaluate a patient portal's effectiveness to convey information to patients. *Journal of Medical Internet Research*. 2016;18(5): e112.

11. Ancker JS, Osorio SN, Cheriff A, Cole CL, Silver M, Kaushal R. Patient activation and use of an electronic patient portal. *Informatics for Health & Social Care*. 2015;40(3): 254–266.

12. Ancker JS, Barrón Y, Rockoff ML, et al. Use of an electronic patient portal among disadvantaged populations. *Journal of General Internal Medicine*. 2011;26(10):1117–1123.

13. Black H, Gonzalez R, Priolo C, et al. True "meaningful use": technology meets both patient and provider needs. *The American Journal of Managed Care*. 2015;21(5): e329–e337.

14. Buist DS, Knight Ross N, Reid RJ, Grossman DC. Electronic health risk assessment adoption in an integrated healthcare system. *The American Journal of Managed Care*. 2014;20(1): 62–69.

15. Cho AH, Arar NH, Edelman DE, Hartwell PH, Oddone EZ, Yancy WS Jr. Do diabetic veterans use the Internet? Self-reported usage, skills, and interest in using My HealtheVet Web portal. *Telemedicine Journal and e-Health*. 2010;16(5): 595–602.

16. Fiks AG, DuRivage N, Mayne SL, et al. Adoption of a portal for the primary care management of pediatric asthma: a mixed-methods implementation study. *Journal of Medical Internet Research*. 2016;18(6): e172.

17. Fiks AG, Mayne S, Karavite DJ, DeBartolo E, Grundmeier RW. A shared e-decision support portal for pediatric asthma. *The Journal of Ambulatory Care Management*. 2014;37(2): 120–126.

18. Latulipe C, Gatto A, Nguyen HT, et al. Design considerations for patient portal adoption by low-income, older adults. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 2015;2015: 3859–3868.

19. Gerber DE, Laccetti AL, Chen B, et al. Predictors and intensity of online access to electronic medical records among patients with cancer. *Journal of Oncology Practice*. 2014;10(5): e307–e312.

20. Graetz I, Gordon N, Fung V, Hamity C, Reed ME. The digital divide and patient portals: Internet access explained differences in patient portal use for secure messaging by age, race, and income. *Medical Care*. 2016;54(8): 772–779.

21. Heyworth L, Paquin AM, Clark J, et al. Engaging patients in medication reconciliation via a patient portal following hospital discharge. *Journal of the American Medical Informatics Association*. 2014;21(e1): e157–e162.

22. Jones JB, Weiner JP, Shah NR, Stewart WF. The wired patient: patterns of electronic patient portal use among patients with cardiac disease or diabetes. *Journal of Medical Internet Research*. 2015;17(2): e42.

23. Jung C, Padman R. Virtualized healthcare delivery: understanding users and their usage patterns of online medical consultations. *International Journal of Medical Informatics*. 2014;83(12): 901–914.

24. Ketterer T, West DW, Sanders VP, Hossain J, Kondo MC, Sharif I. Correlates of patient portal enrollment and activation in primary care pediatrics. *Academic Pediatrics*. 2013;13(3): 264–271.

25. Lyles CR, Sarkar U, Ralston JD, et al. Patient-provider communication and trust in relation to use of an online patient portal among diabetes patients: the Diabetes and Aging Study. *Journal of the American Medical Informatics Association*. 2013;20(6): 1128–1131.

26. Mikles SP, Mielenz TJ. Characteristics of electronic patient-provider messaging system utilisation in an urban health care organisation. *Journal of Innovation in Health Informatics*. 2014;22(1): 214–221.

27. Mishuris RG, Stewart M, Fix GM, et al. Barriers to patient portal access among veterans receiving home-based primary care: a qualitative study. *Health Expectations*. 2015;18(6): 2296–2305.

28. Osborn CY, Mayberry LS, Wallston KA, Johnson KB, Elasy TA. Understanding patient portal use: implications for medication management. *Journal of Medical Internet Research*. 2013;15(7): e133.

29. Phelps RG, Taylor J, Simpson K, Samuel J, Turner AN. Patients' continuing use of an online health record: a quantitative evaluation of 14,000 patient years of access data. *Journal of Medical Internet Research*. 2014;16(10): e241.

30. Pillemer F, Price RA, Paone S, et al. Direct release of test results to patients increases patient engagement and utilization of care. *PLoS One*. 2016;11(6): e0154743.

31. Roelofsen Y, Hendriks SH, Sieverink F, et al. Differences between patients with type 2 diabetes mellitus interested and uninterested in the use of a patient platform (e-VitaDM-2/ZODIAC-41). *Journal of Diabetes Science and Technology*. 2014;8(2): 230–237.

32. Ronda MC, Dijkhorst-Oei LT, Rutten GE. Reasons and barriers for using a patient portal: survey among patients with diabetes mellitus. *Journal of Medical Internet Research*. 2014;16(11): e263.

33. Schneider H, Hill S, Blandford A. Patients know best: qualitative study on how families use patient-controlled personal health records. *Journal of Medical Internet Research*. 2016;18(2): e43.

34. Tieu L, Schillinger D, Sarkar U, et al. Online patient websites for electronic health record access among vulnerable populations: portals to nowhere? *Journal of the American Medical Informatics Association*. 2017;24(e1): e47–e54.

35. Turvey C, Klein D, Fix G, et al. Blue Button use by patients to access and share health record information using the Department of Veterans Affairs' online patient portal. *Journal of the American Medical Informatics Association*. 2014;21(4): 657–663.

36. Urowitz S, Wiljer D, Dupak K, et al. Improving diabetes management with a patient portal: a qualitative study of diabetes self-management portal. *Journal of Medical Internet Research*. 2012;14(6): e158.

37. van der Vaart R, Drossaert CH, Taal E, Drossaers-Bakker KW, Vonkeman HE, van de Laar MA. Impact of patient-accessible electronic medical records in rheumatology: use, satisfaction and effects on empowerment among patients. *BMC Musculoskeletal Disorders*. 2014;15: 102.

38. Wade-Vuturo AE, Mayberry LS, Osborn CY. Secure messaging and diabetes management: experiences and perspectives of patient portal users. *Journal of the American Medical Informatics Association*. 2013;20(3): 519–525.

39. Wright A, Feblowitz J, Maloney FL, et al. Increasing patient engagement: patients' responses to viewing problem lists online. *Applied Clinical Informatics*. 2014;5(4): 930–942.

40. Zarcadoolas C, Vaughon WL, Czaja SJ, Levy J, Rockoff ML. Consumers' perceptions of patient-accessible electronic medical records. *Journal of Medical Internet Research*. 2013;15(8): e168.

41. Zan S, Agboola S, Moore SA, Parks KA, Kvedar JC, Jethwani K. Patient engagement with a mobile web-based telemonitoring system for heart failure self-management: a pilot study. *JMIR mHealth and uHealth*. 2015; 3(2): e33.

42. Goel MS, Brown TL, Williams A, Hasnain-Wynia R, Thompson JA, Baker DW. Disparities in enrollment and use of an electronic patient portal. *Journal of General Internal Medicine*. 2011;26(10): 1112–1116.

43. Riippa I, Linna M, Rönkkö I. The effect of a patient portal with electronic messaging on patient activation among chronically ill patients: controlled before-and-after study. *Journal of Medical Internet Research*. 2014;16(11): e257.

44. Riippa I, Linna M, Rönkkö I, Kröger V. Use of an electronic patient portal among the chronically ill: an observational study. *Journal of Medical Internet Research*. 2014;16(12): e275.

45. Gee PM, Paterniti DA, Ward D, Soederberg Miller LM. e-Patients perceptions of using personal health records for self-management support of chronic illness. *Computers, Informatics, Nursing: CIN*. 2015;33(6): 229–237.

46. Goel MS, Brown TL, Williams A, Cooper AJ, Hasnain-Wynia R, Baker DW. Patient reported barriers to enrolling in a patient portal. *Journal of the American Medical Informatics Association*. 2011;18(suppl 1): i8–i12.

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