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Elizabeth Sprouse Date

How can health care organizations evaluate their patient portals based on likelihood of patient use to assist in developing their portal strategy going forward?

By

Elizabeth Sprouse
Degree to be awarded: MPH
Executive MPH

Applied Public Health Informatics

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How can health care organizations evaluate their patient portals based on likelihood of patient use to assist in developing their portal strategy going forward?

By

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Bachelor of Arts in Journalism
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2000

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An abstract of
a thesis submitted to the Faculty of
the Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health in Applied Public Health Informatics 2017

Abstract

How can health care organizations evaluate their patient portals based on likelihood of patient use to assist in developing their portal strategy going forward?

By Elizabeth Sprouse

Patient portals are becoming standard in health care. While limited research has been conducted, much still needs to be learned about the efficacy and impact of patient portals to effectively engage patients in their health care. Patient portals – secure, online tools patients can use to manage their care and engage with their providers – need to be actively studied to determine how to increase technology acceptance and their usage.

Health care systems and hospitals are faced with competing priorities when it comes to technology planning, and this remains true for patient portals. However, how can organizations go about evaluating their patient portals to help them develop a technology strategy for this tool going forward? There is a need to develop a scoring system for evaluating patient portals based on the likelihood of patients using them to assist in this challenge.

The purpose of this research effort was to develop such a scorecard to arm health care leadership with the ability to strategically design and implement patient portals that patients will use, leading to potential positive impacts in patient care, outcomes and activation – all areas currently under research.

An academic literature review was conducted, and 10 qualitative phone interviews were held with health care leaders throughout the United States to understand their portal implementation efforts and perspectives.

The proposed scorecard is divided into several areas, including: features, design, content understanding, technical aspects and assistance, and operational considerations. Organizations receive an individual score for each section and a compiled score. The overall score gives a picture of how the organization scored at an aggregate level; however, it is the individual scores that can assist organizations in focusing on areas of portal improvement and actionable steps (e.g., implementing certain features, fostering provider support of the tool, ensuring patient help using the portal) to increase patient usage and engagement.

This scoring approach provides a clear process for organizations to use when evaluating their current portals on likelihood of patient use and allocating future work in strategic areas that may drive patients to actively use their portals. Using this scoring approach may lead to improved design and implementation, leading to increased use and, thus, potential positive impacts patients may receive from engaging electronically in their care.

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Introduction

Patient portals are secure, online health management tools patients can use to engage in their own health care. They are available for use via secure, websites or mobile apps and are typically owned and administered by an individual health care organization [1]. This is in contrast to personal health care records (PHRs) that are traditionally owned and updated by the patient him or herself [1]. Basic patient portal example features include a record of office visits, medications list, allergies, immunizations, discharge summaries, lab results, problem lists, past procedures, diagnoses and notes [2, 3]. More advanced features include elements of interactivity, such as the ability to communicate securely with providers (i.e., secure messaging), prescription renewals and self-scheduling [2].

In the United States, there is a growing population needing access to care. An estimated 40 percent of the population has at least one chronic disease (e.g., diabetes), which is associated with 70 to 80 percent of the health care costs in the United States [4]. This percentage will likely continue to increase and is coupled with challenges associated with limited resources in health care and the need to better manage the health of the country's population [4]. In fact, Americans receive only half of all recommended preventive services [5].

Technology innovations, such as patient portals, have the potential to address some of these issues. In fact, technology is so central to public health that it was an objective of Healthy People 2020, a national initiative to improve the country's health through science-based objectives [6, 7]. The health communication and health information technology objective of Healthy People 2020 is to "use health communication strategies and health information technology (IT) to improve population

health outcomes and health care quality, and to achieve health equity [7].” Example goals used to meet this objective include establishing self-management tools, fostering decision-making between providers and patients, and providing accessible and accurate information [7].

Given that technology is central to the objectives of Healthy People 2020, patient portals have the potential to serve as a tool to achieve part of the health communication and health information technology objective. Furthermore, patient portals have also been included in Meaningful Use, a government program used to provide incentives and penalties to health care organizations for the meaningful use of an electronic medical record, leading toward goals of better patient and population health outcomes, transparency, efficiency, individual empowerment, data for research, etc. [8].

To date, Meaningful Use has had three stages – data capture and sharing, advance clinical processes and improved outcomes [8]. Among a variety of detailed measures, this program has included incentives tied to implementation of patient portals, such as the requirement to provide patients with the ability to access their health care information online; view, download and transmit it to others; and communicate electronically with their providers [9-11].

Prior to Meaningful Use, there had been limited implementation of patient portals by health care providers, with just a few larger systems launching portals in the late 1990s [11]. In the mid-2000s, interest grew as Google and Microsoft launched electronic personal health records and the Centers for Medicare and Medicaid Services implemented contracts to study electronic personal health records [11].

Meaningful Use and its measures linked to portal technology served as a directive for the industry to implement them. Others joined early portal adopters like Kaiser Permanente, Boston's Beth Israel Deaconess Medical Center and the Veterans Health Administration in providing patient portals [12, 13].

Given the increasing interest in patient portals, there is a growing trend in evaluating them based on a variety of measures, such as association with quality outcomes, linkage to patient activation and patient technology acceptance of these tools [1, 4, 6, 14-16]. Patient portal implementation can be both technically and operationally challenging for health care organizations, and there is a substantial need to identify the features central to widespread adoption of patient portals by health care recipients. Significant resources, both financial and personnel, are dedicated to portal management in a health care environment. Organizations are often tied to using the portal product provided by their electronic medical record vendor, where there may be limits on which features they can or cannot implement. There are compliance and legal implications to consider when navigating making protected patient health information available via a portal. Additionally, there are decisions to make around operational workflow (e.g., how to enroll patients, how care teams should use the portal), ongoing portal support (e.g., technical assistance for patients) and technology strategy (e.g., planning and implementing enhancements).

However, how can organizations go about evaluating their patient portals to help them to develop a technology strategy for this tool going forward? Regardless of the effect portals may have on health outcomes and patient engagement, one thing is clear – a portal has zero impact if patients do not adopt and continue to use it. There is a need to

develop a standard scoring system for evaluating patient portals based on the likelihood of patients using them to assist organizations in developing their future portal strategy.

As such, the purpose of this research is to develop a scoring approach for health care organizations to use when evaluating a patient portal based on acceptability and use by adult patients receiving care at health care systems or hospitals. The resulting scoring approach may lead to improved user interface design and implementation of a patient portal that patients will be more likely to use, leading to potential positive impacts, such as increased patient engagement, higher quality health care and better health outcomes.

Background

Patient portals are software – such as websites or mobile applications – that patients and/or their caregivers can use to securely engage in their care. Implementation of patient portals, or technology with features common to portals, has spread across the country. For example, 2014 data from the National Coordinator for Health Information Technology shows that 51 percent of hospitals had secure messaging between patients and caregivers in place, while 64 percent provided patients the ability to view, download and transmit their own health-related data – both functions commonly found in patient portals [17]. This is likely mainly as a result of the inception of Meaningful Use, a government program used to provide incentives and penalties for the meaningful use of an electronic medical record [11].

Given the interest in patient portal technology, there is a growing body of informatics literature where studies and reviews have been conducted to evaluate portals based on a variety of measures and areas of focus, such as clinical significance (e.g., patient outcomes, engagement and activation) and patient acceptability (e.g., likelihood of use). The following details what the current literature reveals for these two areas.

Portals and Clinical Significance

As referenced, many studies have been conducted to review the relationship between portals and their clinical significance [1, 4, 11, 18]. To date, available literature shows mixed, inconsistent outcomes. Several studies have cited improved outcomes, as well as clinical and process improvements; other studies have shown little to no clinical benefit [19]. Otte-Trojel et. al conducted semi-structured interviews with Kaiser Permanente members, and found that transparency of information (i.e., giving patients access to their records, results and care plans) and more patient-physician interaction (i.e.,

physicians sending messages to patients regarding their care) improve care management, and portals lead to efficiencies in administrative tasks and provider workflow [15].

However, other studies demonstrated mixed results. Kruse et. al conducted a systematic literature review to study the effect of portals on health quality outcomes. The researchers screened more than 4,000 articles published between 2011 and 2014, analyzing a final 27. Although few of the articles they reviewed reported improved outcomes due to patient portals, several cited improvements in patient disease awareness and understanding, patient self-management, medication adherence, increases in use of preventive medicine, and increases in patient retention and satisfaction [1].

Studies have also been conducted to review the effects of patient portals on patient activation. Riippa et. al conducted a study of primary care patients with chronic conditions in Finland examining patient activation, which looks at patient knowledge of his or her disease, skills to self-manage his or her health care, and confidence in managing his or her care. In their study, the researchers aimed to evaluate what effect a portal would have on the patient activation of patients [4]. They divided study participants into two groups – those who received a portal with medical records, care plan and secure messaging, and those without a portal. The intervention group received access to the portal right away, while the control group received it six months later. The study results showed that increases in activation due to portal use may be associated with an initial higher level of patient activation and that those patients with a higher level of patient activation may be more likely to use a patient portal. From the study, there was not an effect on patient activation associated with portal access; however, it did show that having access to the portal had a stronger effect on those patients who entered the study

with a higher level of patient activation than those who received access to the portal later, but had a lower patient activation coming into the study [4].

Secure Messaging

Often, research on patient portals will focus on a specific portal feature and not a portal as a whole. One of the most commonly studied features is secure messaging, which is the ability for patients to securely communicate with their provider. Secure messaging has been linked to improved self-care, increased use of services and patient engagement [20].

Wade-Vuturo et. al conducted a focus group and survey of adult patients to study the benefit of using secure messaging for Type 2 Diabetes patients at Vanderbilt University. Patients cited numerous benefits of secure messaging, including increased patient satisfaction, efficiency and quality of office visits, and ability to access care outside of in-person office visits [21].

In another secure messaging study, Haun et. al reported the potential of secure messaging in improving use of services, engagement and patient self-care. The team conducted interviews, user testing to have participants complete tasks under observation and reviews of messages for 33 veterans at the Veterans Health Administration. The researchers found that 82 percent of the patients were satisfied with the secure messaging capabilities provided on the Veterans Health Administration secure messaging tool at initial interview, and 97 percent reported being satisfied at a three-month follow-up. The participants reported the following benefits of secure messaging: saving time, drafting messages on their own time without pressure, receiving timely replies and having a written record of communications [20].

Open Notes

In addition to secure messaging, attention is increasingly being directed at the concept of providing patients direct access to their clinicians' notes (e.g., visit notes from providers like physicians and allied health professionals, surgical notes, etc.) via a patient portal. This has been shown to be linked to patients feeling more in control of their care, increased medication adherence, being informed and recalling discussions [16].

The nonprofit organization, OpenNotes, is leading the promotion of this concept, which started to take off in 2010 when Boston's Beth Israel Deaconess Medical Center, Pennsylvania's Geisinger Health System and Seattle's Harborview Medical Center launched a study in primary care settings to review the effects on patients and providers when notes are shared. Little impact in provider workload resulted. Patients appreciated access to their notes and felt more in control of their care. Now, in 2017, more than 16 million U.S. and Canadian patients have access to their health care provider's notes – typically not sensitive notes, such as mental health notes, that are often excluded – and there is increasing acceptance across health care of providing this access to patients [22].

Portals and Patient Acceptability

Patient acceptability of portals has also been extensively researched. Studies include a variety of research focuses, such as which features patients most value, technology acceptance, barriers to use and operational implementation at health care organizations.

Portal Features

Basic example features of a patient portal include a record of office visits, medications list, allergies, immunizations, discharge summaries, lab results, problem lists, past procedures, diagnoses and provider notes [2, 3]. More advanced features include elements of interactivity, such as the ability to communicate securely with

providers (i.e., secure messaging), prescription renewals and self-scheduling [2]. However, researchers are now investigating which features patients view as most valuable and useful to managing their health care.

Some patients have reported wanting portals to include personalized advice, laboratory results and secure messaging features [23, 24]. Other portal users have cited features, such as a summary of upcoming appointments, summary of care team, treatment goals and medication summary, to be useful [24].

Neuner et. al conducted a review of patient portal satisfaction, which analyzed portal enrollment records and usage levels, as well as a survey to portal enrollees, from 10 primary care clinics in the Midwest of the United States. Of 124,379 patients, 23.1 percent were enrolled in 2012 in the portal, compared to 13.25 percent in 2010. Portal features included making appointments, messaging with providers, prescription renewals, major medical record details (e.g., problem lists, medications), and links to an educational library from diagnosis and lab results information. Patients' sentiment toward portal features included greatest satisfaction with secure messaging and access to lab results. Patients reported a lower level of interest in uploading their own health measures [9].

User Design and Technology Acceptance

In addition to features, research has also been conducted on patient portal user design and technology acceptance. Tavares et. al used the Unified Theory of Acceptance and Use of Technology in consumer settings (UTAUT2) theoretical model to understand what prompts people to adopt portals. The UTAUT2 looks at performance expectancy, effort expectancy, social influence, facilitating conditions, use behavior and behavior intention. In a web questionnaire administered in Portugal, the most widely used portal

feature was scheduling. Just 30 percent of the 360 respondents checked the portal regularly. The most important leading factors on use were performance expectancy, habit, effort expectancy and self-perception. The research outcome was an acknowledgement of the importance of ease of user navigation and user acceptance [14].

Lazard et. al used the Visual Aesthetics of Website Inventory (VisAWL) to measure simplicity, colorfulness, craftsmanship and diversity of a portal. Results from the 333 study participants showed the importance of simplicity in user design. Portals need to be easy to understand and well-structured. Inclusion of graphic design features to highlight site navigation, such as color breaks to set off content and graphic elements, is helpful [6].

This outcome is further supported by another research effort by Alpert et. al in which researchers conducted 31 patient interviews and two clinician focus groups with participants using the MyPreventiveCare portal from 12 Virginia practices to understand how well portals convey information. The MyPreventiveCare portal included features such as lab results, medical record information, customized content based on the patient and educational information (e.g., cancer screenings, information on managing chronic conditions). Among patient participants, 43.4 percent had logged into the portal within the past year, with an average access rate of four times annually. Patients most frequently viewed the lab results, medical record information and preventive care suggestions. Patients cited high levels of satisfaction to having instant access to information and not having to call. When it came to usability and design, patients reported that the design was good. Users landed on an intuitive dashboard with colorful icons. Patients cited that a

dictionary was available on every section to look up complex terminology, and the site was easy to navigate [25].

Barriers to Use

Key in understanding patient acceptability to portals is also understanding the barriers to their use. To date, studies show that lack of health literacy, variations based on demographics, technology challenges and operational roadblocks at the health care organization level are barriers [15, 19, 26-28].

Health Literacy

An estimated half of adults in the United States have low health literacy, which has been linked to poorer health outcomes [29]. Studies have been conducted to test the ability for patients to understand the medical information presented to them and features that can assist in supporting patients, such as simple, easy-to-understand writing, explanations and links to educational resources explaining terms. Being able to understand the information being viewed in a portal is not only important to promoting continued use of a portal, but it is also imperative to the health of patients.

In a study, Zikmund et. al sought to determine if adult patients could tell which lab blood tests were outside of reference ranges when viewed in patient portals. Of the 1,817 survey participants, half had Type 2 Diabetes and half were asked to imagine that they did. They were shown lab results in a tabular format without indicators for high or low values. The results indicated that the ability to identify out-of-range values was linked with higher levels of health literacy and numeracy skills [26].

Demographics

Even if portals are designed with technology acceptance in mind, research indicates that patient demographics play a factor in portal access and use. Vulnerable populations with lower income have been linked with not accessing portals [27]. Some

studies have shown no differences between younger and older attitudes toward portals [30]. Other research studies have shown a linkage to age, education, health and having a role as a caregiver affecting attitudes and acceptance of patient portals [31]. In fact, older patients are increasingly using the Internet [32]. Schprechman et. al's study of English-speaking older adults with systolic heart failure between ages 50 to 85 years old, 45 percent used the Internet to get information on heart failure, and a majority used the Internet and email [32].

Race and ethnicity also appear to be factors in portal adoption. In a national survey of 3,677 people, Peacock et. al found no indication of difference between race and ethnicity on the perceived importance of patient portals, but that whites and non-Hispanics were more likely to be offered access to a portal and subsequently use it as compared to black and Hispanic survey participants [16].

Technology Challenges

A patient portal can contain all the right features, but if technology barriers get in the way of a patient using it, he or she will not adopt the tool. Portals can be hard to use, and taking interface design into consideration is important [33]. Focusing on simplifying the patient experience, involving patients in the portal at inception and conducting user testing are important [15].

Further, patients may need assistance with initially enrolling in portals and understanding how to access them. Having technical support on hand has been linked to adoption [28].

Operational Roadblocks

Outside of the organizational adoption of patient portal technology, operational roadblocks can also limit the likelihood of portal adoption. For example, provider

endorsement of the portal to his or her patients is critical to patient adoption [11]. It is important that organizations are aware of their patient portal and promote them to patients and also use them.

In one study by Ryan et. al interviewing seven patients and four providers in Ontario, Canada, patients had limited knowledge of portals, and, while providers had more, they also did not have direct experience with them. This study also reiterated the need to include patients in the early parts of implementation, as well as conducting user acceptance testing, to increase likelihood of patient usage [19].

Evaluating Portals Based on Likelihood Patients Will Use Them

Although there is this growing body of literature reviewing and studying portals for their association with clinical significance and patient acceptability, as yet, from what can be found through this research, there is not a consistent evaluation approach available for health care organizations to use when evaluating their portals. Although the potential clinical benefits of patient portals are important to understand and evaluate a portal by, if there is limited patient adoption of a portal, those clinical benefits will not be possible. As such, there is a need to develop a standard scoring system for evaluating patient portals based on the likelihood of patients using them to assist organizations in developing their future portal strategy.

The work that has been conducted thus far is a valuable contribution to understanding the likelihood of adoption and usage of patient portals. However, there are limited tools available for use by health care organizations to evaluate patient portals, whether they are looking to enhance existing features or adopt a new patient portal software system. Health care organizations lack a rigorous patient portal evaluation tool, one that is based on evidence and the experience of industry experts.

As previously mentioned, a great deal of effort and resources goes into managing patient portals. Technology road-mapping can be challenging, as organizations determine what they focus on and which features of a portal are most important.

This future planning is even more significant when you consider that, despite efforts to implement portals, patient adoption and usage remain low [19]. As such, health care organizations need a consistent way to evaluate their portals, with likelihood of patient use being a sound first step.

The purpose of this study is to develop a scoring approach for health care organizations for use in evaluating a patient portal based on acceptability and use by adult patients receiving care at health care systems or hospitals. The aims include:

- Conduct an academic literature review to identify features and operational measures of patient portals that haven shown to foster user acceptance and continued use.
- Conduct qualitative interviews with health care systems to identify the features and operational measures that are most associated with portal use.
- Develop a scorecard organizations can use to evaluate their patient portal based on the likelihood of patient adoption and usage.

Methods

Two primary methods of data collection were conducted for this research study – an academic literature review and qualitative phone interviews with health care executives at U.S. organizations with patient portals. The data was then analyzed to inform the study results.

Step 1: Academic Literature Review

A literature review was conducted of academic and grey literature published since 2010. The primary search engine used was PubMed. Grey literature was included only when it was a well-known, reputable online source, such as OpenNotes.org. Focus was placed on studies involving adults and not pediatric patients. Behavioral health studies were excluded. International studies were included to expand the body of literature available. Keyword search terms included:

- Patient portal use
- Patient portal and acceptance
- Patient portal and effect
- Patient activation
- Disease management and patient portal
- Patient portal and engagement
- Patient portal and activation
- Patient portal and quality
- Patient portal and outcomes
- Patient portal and medication management

A notetaking template in Word was used to facilitate review of each reference. While reviewing each reference, as available, the following was noted: study aim, where conducted, sample description, methods, portal features of the organization where the study took place, findings and any relevant notes.

Additional relevant resources were identified when cited within the references. A mixture of research studies was sought, considering variations in sample size and study design.

Step 2: Qualitative Interviews

A sample of convenience of U.S. health care leaders involved in portal activities was approached to solicit agreement to participate in phone interviews. Potential interviewees were solicited via email, and a brief description of the research was provided.

Inclusion criteria included:

- Larger health care organizations – hospitals or health care systems with inpatient and ambulatory services – over small, private practice offices
- For-profit and nonprofit health care systems
- Academic and non-academic health care systems
- Cross-section of vendor platforms used for the organizations' portals (e.g., Cerner, Epic)

Exclusion criteria included:

- Pediatric-only-focused organizations
- Behavioral-health-only-focused organizations

The recruitment process included soliciting referrals from network contacts:

- **Cerner Corporation Executives:** Cerner is a large health information technology company.
- **Chief Medical Information officer at Emory Healthcare:** Julie Hollberg, MD, is the Chief Medical Information Officer at Emory Healthcare.

- **OpenNotes.org:** OpenNotes.org is a nonprofit organization working to advocate for the sharing of visit notes with patients.

An interview guide was prepared to ensure uniformity of questions. The questions were divided into four categories:

1. Basic background information about the organizations, such as size and location
2. Portal background, such as portal vendor, initial go-live date, features
3. Demographic background, such as how many patients are enrolled, access rates and features most/least used
4. Patient sentiment, such as tactics used to collect patient sentiment toward the portal, reasons patients provide for using the portal and patient feedback on areas of opportunity for the portal

See the appendix for the full interview guide.

Step 3: Analysis Plan and Scorecard Development

Literature Analysis

Once the initial review of references was complete, an abstract template was created in Excel to assist with analyzing the data based on a frequency distribution. Within the abstract template, references were listed by citation. Article type (e.g., study, systematic literature review) was captured, as well as any key notes about the reference. The remaining columns of the spreadsheet were used to list the portal feature or operational area (i.e., for the sake of this study, elements) mentioned in references.

To complete the analysis, each reference was reviewed for portal elements linked to increased likelihood of patients using a portal. As elements were highlighted as having a potential relationship to the likelihood of a patient using a portal, these features were added to the spreadsheet. If an element was noted at least one time in a literature source,

this counted as one tally and it was added to the spreadsheet. If the same element was noted in subsequent sources, each additional reference contributed one point to the ongoing tally for that element.

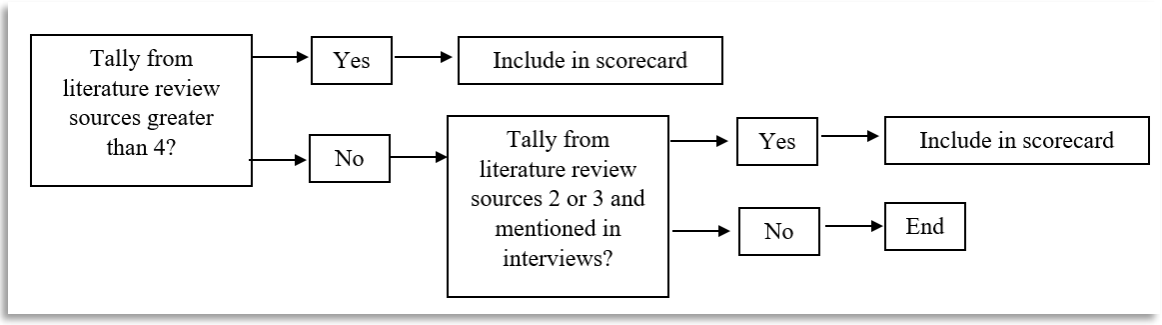
Qualitative Interviews

As with the literature review, an abstract template was created in Excel to complete a frequency distribution of features each organization readily stated they had available on their respective portals and the features interviewees conveyed potentially contributed to the likelihood of patients using a portal. For scorecard purposes, the frequency at which features that potentially contribute to the likelihood of use were referenced contributed to the final scorecard. When an element was referenced at least one time by an interviewee, it made it to a list of elements that could potentially inform the scorecard. For each subsequent, one-time mention by an additional interviewee, the tally for the element increased by one.

Develop Scorecard

If an element received a score of four or greater from the literature review analysis (i.e., it was noted in at least four references), it was included in the final scorecard. If an element had a tally of two or three references, and it was also noted during the qualitative interviews as a factor in portal use by patients, it was included in the final scorecard.

Visual 1: Inclusion in scorecard



To make the scorecard easy to use, when elements were added to the scorecard, some were broken back out from previously combined elements/themes, which had been combined to decrease the large list of elements. This step also aimed to remove as much subjectivity to the end user completion of the scorecard as possible.

The final scorecard was divided into five sections: features, design, content understanding, technical aspects and assistance, and operational – allowing for percentage scores within each category, as well as an overall percentage score. Within each category, the data elements were considered high or medium priority, based on the quantitative counts from the data analysis. Elements ranked high are worth three points each; elements ranked medium are worth one point each. Note that those elements that had been previously combined into a single theme were counted as having received the tally from the combined amount.

Each section's weight distribution was developed as follows:

- **Features, design and content understanding sections:** If an element had received more than four tallies during the data analysis, it was weighted with a three. If it received less than four tallies, it was weighted with a one.
- **Technical aspects and assistance section:** If an element received more than eight tallies, it was weighted with a three. If it received less than eight tallies, it was weighted with a one.
- **Operational section:** Both elements were weighted with a three.

The purpose of this weighting was to distribute points within sections weighted appropriately for their contribution to their potential association with portal usage.

The final scorecard was designed to allow for easy completion. To complete the scorecard, organizations input a one or zero for each element into the scorecard based on if they can attest to having achieved the data element with their portal. If they enter a one, they receive the allotted points for the elements. If they enter a zero, they do not receive any points for the element. A percentage score is available for all five categories. The overall score is an average of the percentage score for each category.

Results

The following results section is broken out into the two phases of this project – literature review and qualitative interviews.

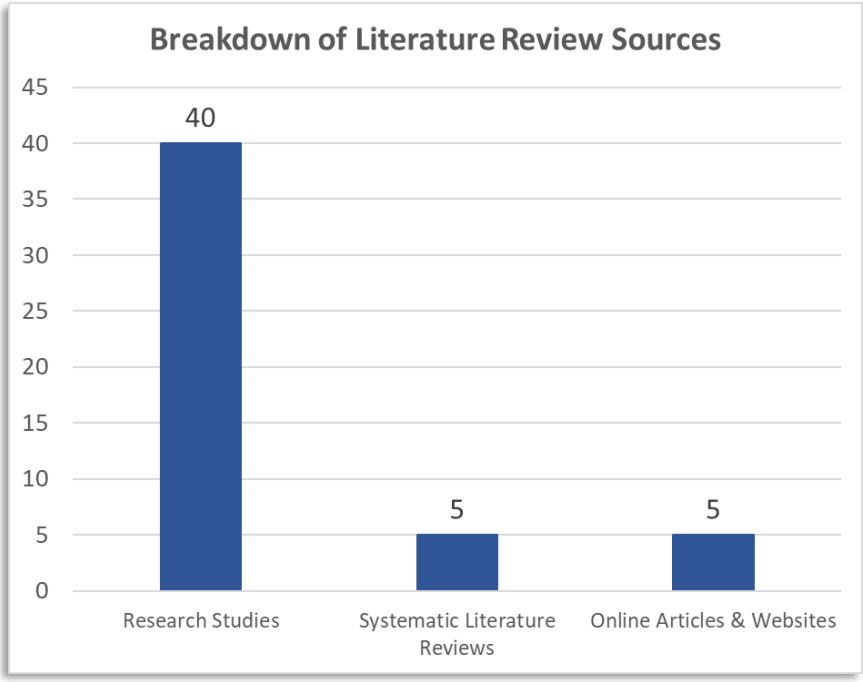
Literature review results

From the literature review, there were 50 potential references assessed for eligibility to use in the data analysis.

Table 1: Literature Review: Main Focuses of References

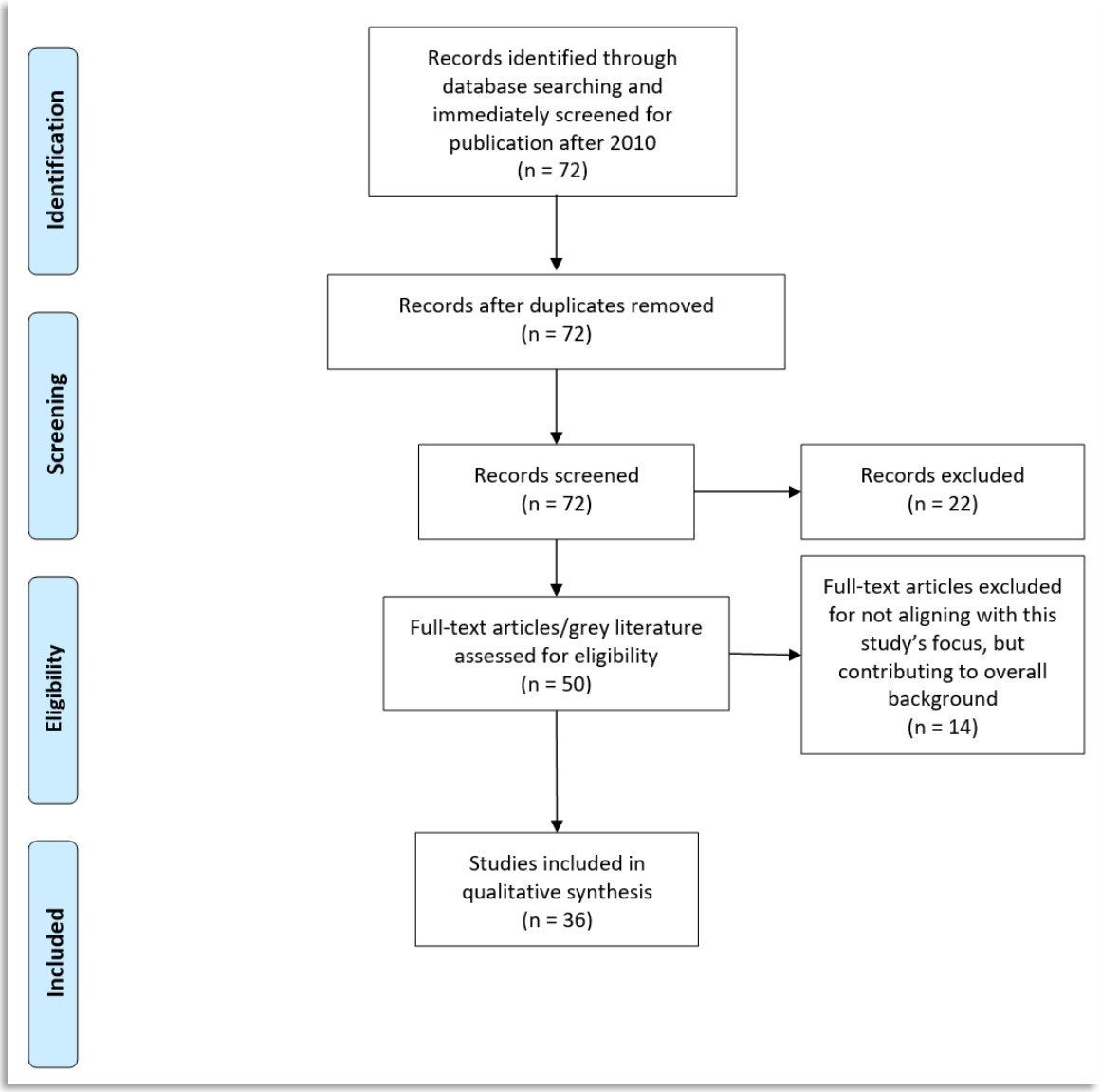
Focus	***Tally***	***% n=50***
Effect on patient as a health care consumer (e.g., activation, engagement, loyalty)	3	6%
Effect on patient outcomes, delivery of care and use of services	8	16%
Effect on clinical workflow	3	6%
Background grey literature on health care technology and open notes	2	4%
Barriers to portal adoption (e.g., health literacy, demographics)	10	20%
Portal technology acceptance and patient preferences	24	48%

Visual 2: Literature review sources



As mentioned, as references were collected for review, they were included or excluded immediately, meaning that the 50 potential references were all authentic candidates for inclusion in the literature analysis. However, from the 50 eligible references, 12 were not eligible for analysis, as they were relevant to the overall understanding of the research topic, but did not include contributions to the purpose of this study. A final 36 references were included in the quantitative analysis.

Visual 3: Reference Study Eligibility



[34]

As mentioned in the methods section, to complete the literature review analysis, each reference was reviewed for portal elements linked to increased likelihood of patients using a portal. Elements were tallied based on the number of sources they were cited in.

The element categories at initial evaluation included 60 different varieties. These elements were then grouped by similarity and categorized by 38 available elements to reduce the potential complexity of the final scorecard. When initialing reviewing these elements prior to developing the scorecard, they were categorized into features, design and organizational adoption, and operational efforts.

Table 2: Literature review data analysis by features, design and organizational adoption, and operational efforts

Reponses	***Tally***	***% n=36***
Features		
Personalized content that helps with disease management (messages, education, recommendations, next steps, treatment goals, care plan)	21	58.33%
Secure messaging	14	38.89%
Lab results	11	30.56%
Explanations: Disease information and terminology dictionary; medication and side effects; test purpose and interpretation (link to more info)	9	25.00%
Portions of record, including visit details (notes, summary)	9	25.00%
Rx renewal	8	22.22%
Interactivity (diary, patient-generated data)	6	16.67%
Security assurances	4	11.11%
Appointment scheduling	3	8.33%
Proxy access to many at once	3	8.33%
Medication summary	3	8.33%
Add value; don’t compete with what is already out there	2	5.56%
Appointment reminders	2	5.56%
Upcoming appointment summary	2	5.56%
Available as an app	2	5.56%
Referrals	1	2.78%
Summary of care team	1	2.78%
View bills and make payments	1	2.78%
Socially communicate with others with similar conditions	1	2.78%
Medication reconciliation	1	2.78%
Comparison to other patients	1	2.78%
Input information about who can manage your care	1	2.78%

Learn about research opportunities	1	2.78%
Design and Organizational Adoption		
Simple design and use (easy to use, no usability issues, large font, images, single portal entrance/no multiple portals, browser agnostic, assistive technology for things like vision impairment, icon driven, structural features set off design/graphical elements, technical up time)	27	75.00%
Easy to register and log in	13	36.11%
Address health literacy	11	30.56%
Simple language/intuitive/gentle	10	27.78%
Involve providers in adoption	6	16.67%
User testing & involvement in design	4	11.11%
Address numeracy skills	3	8.33%
Printer-friendly summaries and information	2	5.56%
Email functions like print, spell check, formatting	1	2.78%
Assess organizational readiness and patient needs	1	2.78%
Operational Efforts		
User training	8	22.22%
Tech support	5	13.89%
Awareness promotion	4	11.11%
Sustained use key	2	5.56%
Unbiased invitations (invite everyone)	1	2.78%

Features ranking

Of the features, the highest ranked feature with 21 references citing it was personalized content that helps with disease management (e.g., messages, education, recommendations, next steps, treatment goals, care plan). The second highest ranked feature was secure messaging with 14 tallies.

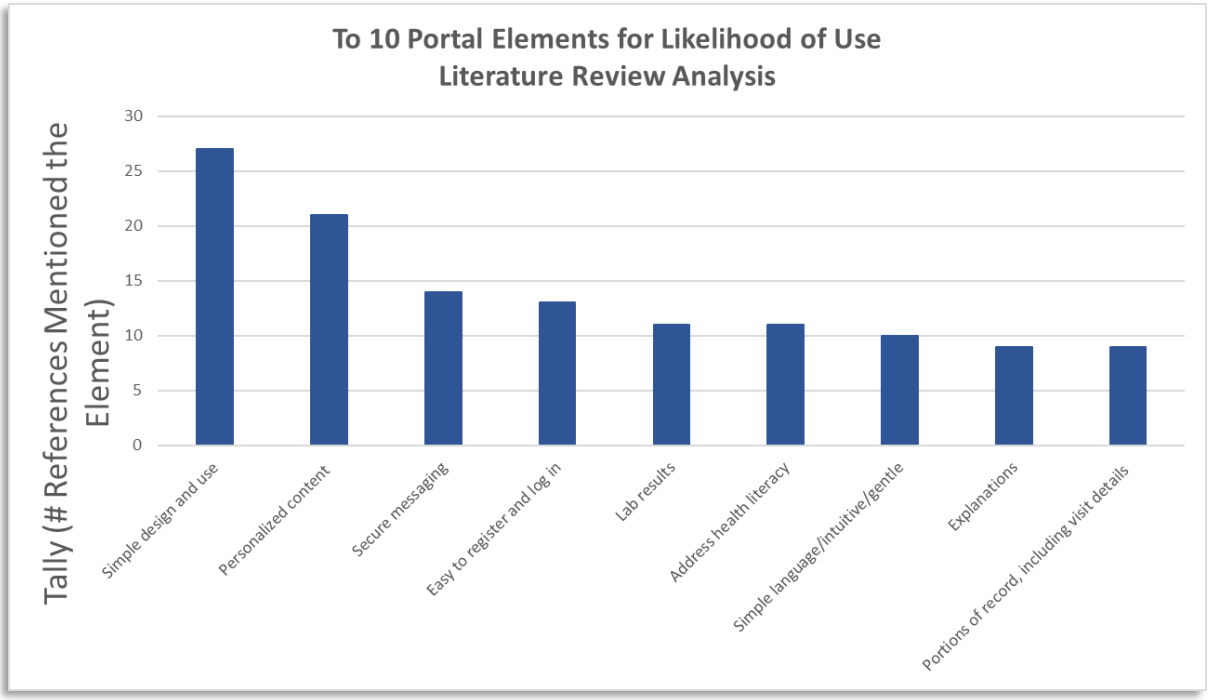
Design and organizational adoption ranking

Of the design and organizational adoption elements, the highest ranked feature was simple design and use (e.g., easy to use, no usability issues, large font, images, single portal entrance/no multiple portals, browser agnostic, assistive technology for things like vision impairment, icon driven, structural features set off design/graphical elements, technical up time) with 27 tallies. The second was ease of registration and log in with 13 tallies.

Operational efforts ranking

Of the operational efforts for patients, the highest ranked element was user training with a score of eight. The second highest ranked element – tech support – was referenced by five sources.

Visual 4: Top 10 portal elements for likelihood of use from the literature review analysis



Qualitative interviews results

A total of 10 qualitative phone interviews with U.S. health care leaders involved in portal activities took place in April and May 2017. The leaders who participated in this effort were representatives from health care organizations across the United States that use varying portal technology (e.g., Cerner, Epic, home-grown technology). All interviewees agreed to participate in the interviews and provided candid dialog on the history of their organization's portal, portal features, analysis of portal use by patients and features they considered were/would be tied to increased likelihood of patients using the portal.

Interviews were scheduled over email and conducted via phone. On average, phone interviews lasted between 30 minutes to one hour. Answers were collected electronically using the prepared interview guide.

Table 3: Interviews were conducted with:

Organization	Representative	Of Note
Billings Clinic *(Montana)*	Patti Reisinger, RHIT, CCS, Director, Health Information Management	• Covers much of Montana, western Dakotas and northern Wyoming • Multi-specialty group practice • 304-bed hospital • Level III trauma center • Skilled nursing and assisted living facility • About 4,000 staff, including more than 400 providers • 11 affiliates
Fort HealthCare *(Wisconsin)*	LaBebe Nickell, CIO; Christopher Manakas, MD, CMIO	• Only hospital in Jefferson County, Wisconsin, a rural area • 72-bed hospital • Ambulatory surgery and specialty clinics • Employed provider base of 50, with most active medical staff being employed
Geisinger Holy Spirit *(Pennsylvania)*	Richard Schreiber, MD, FACP, CMIO	• Community hospital sponsored by Sisters of Christian Charity • Behavioral health, breast care center, cancer center, cardiac rehab, family medicine and other specialties • Recently purchased by Geisinger • An estimated 550 providers on medical staff
Grady Health System *(Georgia)*	Daniel Wu, MD, CMIO	• Includes Grady Memorial Hospital, known for its trauma center, and six other facilities • One of larges public health systems in United States

		• Physicians are faculty at Emory University and Morehouse • An estimated 600 physicians active on a daily basis, with potentially 1,000 credentialed
MedStar *(Maryland and D.C. area)*	Kevin Coakley, Director, myMedStar Patient Portal	• 10 hospitals • Urgent care • Ambulatory care • Estimated 30,000 employees • Estimated 6,000 affiliated physicians
Memorial Hermann *(Texas)*	Alan Weiss, MD, CMIO and Associate Vice President Ambulatory Services	• 16 hospitals • Specialty programs • Teach hospital for McGovern Medical School • 24,000 employees • 5,500 affiliated physicians
Piedmont Healthcare *(Georgia)*	Robert Budman, MD, MBA, CMIO	• 7 hospitals • 19 urgent care centers • 94 physician practice locations • 1,615 Piedmont Clinic members • 16,500 employees
UAB Medicine *(Alabama)*	Jorge Alsip, MD, CMIO	• Academic health care system with hospitals and clinics • Rough estimate of 1,600 providers (800 residents, 800 attendings) • Rehab hospital • Behavioral health hospital • Women's and children's hospital • Six affiliates
UHS of Delaware, Inc. *(Across United States)*	Marreddy (Reddy) Yeruva, MD, Assistant CMIO; Mike Meall, Manager, Information Services	• 28 acute care hospitals in three regions across the United States – East, Central, West • Additional facilities in Puerto Rico, U.S. Virgin Islands and United Kingdom • Some primary care and ambulatory care practices • 81,000 employees

Veterans Health Administration *(Across United States)*	Susan (Sue) Woods, MD, MPH, Past Veterans Health Administration with recent roles as Associate Chief of Staff, Informatics & Research, VA Maine; and Director of Patient Experience, Connected Care Office *Current founder and principal at HiTecHiTouch, LLC*	• 1,233 health care facilities, including 168 medical centers and 1,053 outpatient sites • Serves more than 8.9 million Veterans annually

[13, 35-53]

Table 4: Qualitative Interview Results

Reponses	***Tally***	***% n=10***
Organizational Activities		
Actively track enrollment	8	80%
Track who is using the portal (e.g., age)	4	40%
Track how patients use the portal	6	60%
Seek patient sentiment	6	60%
Features Available on Their Portals		
Labs	10	100%
Rx refills	10	100%
Messaging	9	90%
Radiology	7	70%
Medications	7	70%
Available as an app	7	70%
Problem list, allergies, immunizations	6	60%
Procedures	4	40%
Appointment view	4	40%
Notes	4	40%
Health reminders	3	30%
Pathology	3	30%
Appointment request	3	30%
Schedule appointments	3	30%
Education	3	30%
Request copy of record	1	10%
Find a doctor	1	10%
Request referrals	1	10%
Surveys (pre and post appointments)	1	10%
Can add pharmacies	1	10%
Bill pay	1	10%
Features Felt Were/Would Be Associated Increasing the Likelihood of a Patient Using a Portal		

Portal of record – labs, radiology, notes, pathology, etc.	10	100%
Messaging	6	60%
Design	6	60%
Medications – list, renewal function	5	50%
Appointments – schedule, view	3	30%

All 10 – 100 percent (n=10) organizations have established portals. Of the 10 organizations, early adopters of portal technology included the Veterans Health Administration, Billings Clinic, Fort HealthCare and MedStar. The Veterans Health Administration first piloted its portal – My HealtheVet – in 2000 [13]. Billings Clinic piloted its portal in July 2008, followed up by a full go-live in 2010 [35]. Fort HealthCare launched its portal October 2011, and it also started releasing patient notes January 1, 2017 [37]. MedStar launched its ambulatory portal in early 2010, expanding to its hospitals in 2014 [43].

Within the 10 organizations, there were varying efforts on establishing an organizational portal strategy, tracking who is using the portal and how, and garnering patient sentiment about the portal. Of the 10 organizations interviewed, 80 percent (n=8) actively tracked enrollment. UAB Medicine noted that 110,000 patients were enrolled in its portal, Piedmont Healthcare 700,000 and Billings Clinic 33,113 [35, 47, 49]. Fort HealthCare tracked patients enrolled, invitations sent and invitations claimed. At Fort HealthCare, as of January 1, 2017, 11,269 patients were enrolled in its portal. From August 1, 2011, through April 17, 2017, 31,006 portal invitations were sent and 48.4 percent, or 15,000, claimed [37].

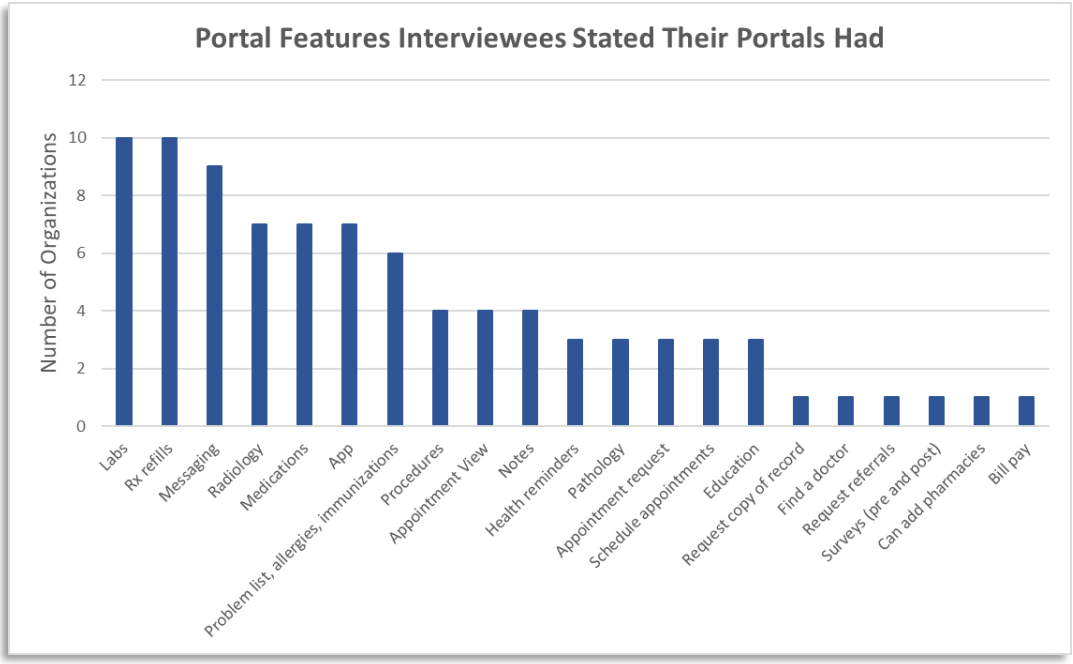
Of the organizations interviewed, 40 percent (n=4) actively track who is using the portal (e.g., age) and 60 percent (n=6) track how patients use the portal (e.g., what areas of the portal they view). Of the organizations that track who is using the portal and how,

they often use analytics tools and visit information. Grady Health System provided a breakdown of portal usage by feature from January 1, 2017, through May 10, 2017. Of note, there were 140,098 hits to the messaging component and 133,547 for labs [41].

Of the organizations that seek patient sentiment on the portal, which was 60 percent (n=6) of the organizations interviewed, they employed a variety of tactics, such as online surveys, a website feedback button, focus groups and in-office paper surveys.

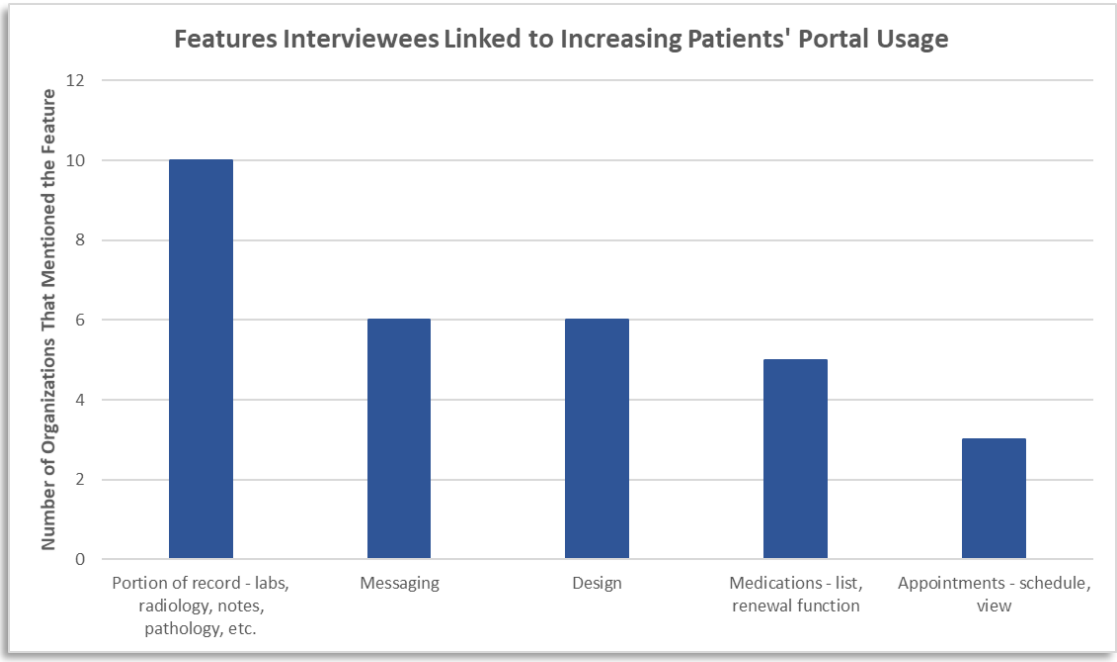
Although perhaps not directly aligned with increasing likelihood of portal use, the features the organizations currently had available in their portal were collected for reference during this study. Of the most common features, all 10 organizations – 100 percent (n=10) – pushed lab results to their portals and had prescription refill/renewal functionality. Further, 90 percent (n=9) offered messaging between the patients and their provider teams, 70 percent (n=7) included radiology reports, 70 percent (n=7) published current medications and 70 percent (n=7) also offered their portal as an app.

Visual 5: Features interviewees noted were available in their portals



When evaluating the interviews based on the features the portal leaders had seen or thought to be associated with likelihood of use, five features stood out for consideration in the development of the scorecard. All 10 organizations – 100 percent (n=10) felt that providing portions of the medical record to patients – particularly lab results, as well as radiology reports, visit notes and pathology reports – was linked with patient likelihood to use the portal and a feature that patients wanted. Further, 60 percent (n=6) cited messaging, 60 percent (n=6) highlighted an emphasis on usability and user-friendly design, 50 percent (n=5) highlighted availability of a current medication list and prescription renewal functionality, and 30 percent (n=3) cited appointment scheduling capabilities and view.

Visual 6: Features interviewees noted were associated with patients' likelihood to use their portal



Further, in addition to ranking features based on the numbers of organizations that mentioned them, the organizational interviews were of significance when it came to the

interviewees' candid qualitative statements. Those statements that were particularly relevant and assisted in framing the development of the scorecard are outlined below.

Table 5: Summarized statements of note from qualitative interviews

Features Patients Want and Use; Predictors of Use
Features used most: Highest used is test results and second is secure email and Rx refills. Very few care about allergy lists and after-visit summaries. **Predictors of use:** Broadband at home, comfort with Internet, frequency of using the Internet. **What patients want and increasing likelihood of use:** Patients have wanted records, test results. Some of the most difficult comments have to do with usability and navigation. There is a five-step journey to portal value. Starts with knowing about it. Then, knowing that it has value – combination of physician/nurse/friend saying you should use it or they try it out and find out that it is helpful to them. Then, the tool has to be usable and well-designed or they will give up. We have a bar for passwords for security the same level as care team to get into the portal, which can't do for consumers. Must make passwords easy. It has to meet people's needs. It could be the best portal in the world with best design, but if doesn't meet needs, won't have usage.
Why Patients Do Not Use the Portal and Negative Feedback
Patient feedback: Difficult to navigate and find things. Items are not labeled intuitively. Multiple clicks. If had ability to request more appointments, would use it more. Not intuitive. Need to provide more education on where to find things. **Reasons why patients do not use the portal:** Too troublesome, don't know how to use computers **Feedback from patients:** Continuity of care documents are poorly organized. There are headers, but the content is sequenced poorly and either has not enough information or way too much. Need to design in a meaningful way. **Reasons why patients do not use the portal:** Had some difficulty in the past with trying to aggregate two records into one, been some inaccuracies. Those have been corrected, but it has taken time to shake that perception. Dated looking and not all the HTML capabilities that a modern version should have. **Reasons why patients don't use the portal:** Computer skills. Computer challenges – can't log in. Initially had issues with multiple enrollment messages to those who had already enrolled.

Why patients do not use the portal: When we were running campaigns to engage patients, biggest challenge was when we sent invitation, they would be rounded on – couldn't remember email address and password. Tech barrier. "I don't feel like it. I'm too sick. Technological barrier."
Organizational Efforts
Portal challenge: One of the things we have struggled with is having a consistent operational leadership around portal strategy. It has been a challenge to pull someone away from their primary responsibility. **Organizational operational support:** Steering committee that meets monthly/every other month – review where are, new functionalities and where would like to go. **Increasing engagement:** Had a surge in hospital engagement due to liaisons assisting patients; watched unique visits climb. **Usability:** Created some tutorials that are available. A lot of calls to help desk on how to accomplish tasks. Analysts created PDF tutorials to guide patients through. **Future enhancement:** Working to connect all patient apps – portal, bill pay, scheduling – into a single app. **Guidance on increasing engagement:** Re-phrase your messaging to patients to if they want to see their records versus if they want to access the portal.

[13, 35, 37, 39, 41, 43, 45, 47, 49, 51]

Discussion and final scorecard

Patient portals provide a means for patients to securely engage in their own care electronically. In the timeline of technology, portals are relatively new and have achieved significant presence in the health care industry within the past 10 years. Portals have the potential to increase patient engagement, activation and outcomes; however, until portals are embraced by all patients, it will be challenging to fully study their association with these types of achievements. As such, understanding how to get patients to use a portal to begin with is imperative.

The purpose of this research effort was to develop a clear scoring approach for health care organizations to use when evaluating a patient portal based on acceptability and use by adult patients receiving care at health care systems or hospitals.

When considering the data analysis for this research, it is important to note that, if an element has a low ranking, this does not necessarily translate to not contributing to likelihood of use. Even a score of one represented “making the board” and having been referenced by at least one of the references used in this analysis, which included references that employed a large-scale systematic review of multiple references. Also, in including studies published after 2010, it is possible that those features newer to portals (e.g., self-scheduling) weren’t ranked as high because they have not had the opportunity to be studied as frequently as the features more common to portals earlier in their development (e.g., secure messaging). For example, it is likely this is why scheduling features came up more often in the qualitative interviews versus in the academic literature review.

Phases of Portal Adoption

From this study, it became clear that there are two phases to patient portal adoption by patients that health care organizations need to consider: initial enrollment in/adoption of a portal and sustained use. There are contributing factors to both of these. These two phases work together; you cannot have authentic portal use if you don't successfully achieve both phases.

Key in Initial Enrollment in/Adoption of a Portal

As demonstrated by the literature citing the importance of easy registration and login processes, to have widespread enrollment in a portal, it is important to focus on ease of registration and enrollment. With this in mind, it must be easy for patients to register and complete the enrollment process. The enrollment process must be clear, whether patients self-enroll or are sent an email invitation with specific instructions on how to complete the enrollment process. Whether an easy-to-find website or mobile application, logging in should be easy, per the evidence, and not a barrier. The design of the login process should be intuitive, employ large graphics to help guide the patient and use other helpful design elements, per the continual emphasis on simple design and use.

Keeping the importance of an easy enrollment process in mind, one can take the next step in developing effective ways to help patients along, such as how-to materials being readily available and help support being available via phone or other methods (e.g., online chat). Further, organizations must actively promote enrollment. This could be achieved with streamlined brochures and team member promotion at every level – from scheduling to check-in to providers reminding patients that the portal is how they wish patients to communicate with the care team for non-urgent clinical questions, prescription renewal, etc.

Key in Sustained Use

Enrolling in a portal does not equal continued use. Once patients have enrolled in the portal, to ensure their active use, the features they want and need must be present and working correctly. For example, as this study indicates, this includes personalized content to help them manage their care, lab results, radiology reports, prescription renewal function, secure messaging, scheduling and more.

In addition to having the features associated with sustained use available in the portal, the research indicates that these features must be easy to use. The portal's design should be intuitive, with everything labeled and graphic elements helping navigate the user. And, regardless of how easy the portal may appear to be to use, additional help via a phone line, online chat, etc., as well as how-to materials easily accessible within the portal, are key.

Further, organizations may have patients who very much want to engage in their portals; however, if the care team is not actively supporting this engagement, likelihood of use will decline, as evidenced by the literature emphasizing organizational support of the portal. As such, organizations must include providers in the launch of their portal, assist teams in understanding the value of the portal – not just for patients, but also to streamline their own workflows – and promote using the portal for communication with patients. To assist in this operational support, organizations could consider having a dedicated team of two to three people who lead the technical and operational efforts of the portal. This effort often falls to Chief Medical Information Officers who have competing priorities and need support of an administrative team.

Scorecard

The following scorecard considers the above phases of portal adoption and serves to provide an easy-to-complete assessment of an organization's portal and portal strategy. To complete the scorecard, organizations input a one or zero for each element into the scorecard based on if they can attest to having achieved the data element with their portal. If they enter a one, they receive the allotted points for the elements. If they enter a zero, they do not receive any points for the elements. A percentage score is available for all five categories. The overall score is an average of the percentage score for each category.

Visual 7: Portal – Patient Likelihood of Use Evaluation Scorecard

Enter 1 or 0 for each element. Each section is allocated its own score (i.e. a percentage of available points, with the aggregate score being an average of all the section scores).

Portal - Patient Likelihood of Use Evaluation			
	Available Points	*Directions: Input 1 or 0*	Points Earned
Features			
Personalized Education	3		0
Care Plan - Recommendations, Next Steps, Goals	3		0
Secure Messaging	3		0
Results - Labs, Radiology, Pathology	3		0
Notes and Visit Details	3		0
Prescription Renewal/Refills	3		0
Medication Summary	1		0
View Appointments	1		0
Appointment Reminders	1		0
Scheduling	1		0
Features Score			**0%**
Design			
Large font	3		0
Images and illustrations	3		0
Icon driven	3		0
Structural features/graphical elements set off design	3		0
Assistive technology (vision impairment help)	3		0
Simple and easy to use	3		0
Involved patients in design and testing	1		0
Design Score			**0%**
Content understanding			
Disease information	3		0
Terminology dictionary	3		0
Medication and side effect explanation	3		0
Test purpose and interpretation	3		0
Simple language that is gentle and intuitive	3		0
Content understanding score			0%
Technical aspects & assistance			
Easy to register and log in	3		0
Browser agnostic	3		0
Single portal for the organization	3		0
Limited downtimes	3		0
Technical support available	1		0
User training	1		0
Security assurances to patient	1		0
Technical aspects & assistance score			0%
Operational			
Patient awareness campaigns	3		0
Involvement of providers in portal launch and sustainment	3		0
Operational score			0%
Overall score			0%

As referenced above, in completing the scorecard, organizations obtain individual percentage scores for features, design, content understanding, technical aspects and assistance, and operational considerations. The overall score gives a picture of how the organization scored at an aggregate level; however, it is the individual scores that can assist organizations in keying in on actionable steps they can consider taking to increase the likelihood that patients will use their portal. For example:

- **Features:** To improve a features score, organizations can identify those features not available on their portal and potentially slot the ones listed on the scorecard, especially those with a weight of three, above other portal technology enhancements.
- **Design:** If an organization would like to increase its design score, which may be easier in some instances than implementing a new feature, it can use the design elements on the scorecard to run through a checklist of potential improvements, such as using line breaks, images or a larger font (or capability for the user to expand the font if he/she desires).
- **Content understanding:** Adding links to more information or additional explanatory text are two quick ways to improve content understanding. Addressing softer and simpler language within the portal may be something portal leaders can quickly institute; however, larger discussions around tone and language in messages or documentation will likely be a longer path organizationally, but one potentially worth navigating.
- **Technical aspects and assistance:** For organizations looking to improve in this area, they may want to consider working with their vendor or technical team to

optimize the registration/login process. Other initiatives are to create simple user guides for patients or how-to videos, or incorporate frequently asked questions directly within the portal. Advanced assistance would be employing team members to answer help calls from patients.

- **Operational:** There are two audiences in the operational category – patients and providers.
    - For patients, organizations can create streamlined handouts with specific information patients need to know – why use the portal, how to register, how to access the portal and how to get help. Encourage all members of the care team to speak with patients regarding the portal. Change portal messaging from asking patients if they want to be enrolled to automatically inviting them to enroll. Other potential initiatives include:
        - Including text on discharge or depart summaries that remind patients that content is available on the portal
        - Partnering with Medical Records to insert promotion materials when the department sends records to patients
        - Ensuring the portal has prominent presence on the organization's external website, making it easy to get to more information
    - For providers, include representatives on a portal steering committee for their input and guidance. Ensure that providers know how to use the portal to communicate with their patients. Training is key. Attend physician meetings to openly discuss the portal. Link enrollment or use of the portal with incentives for care teams.

By employing the scorecard to evaluate a portal, organizations can more readily plan their next steps in the patient portal journey. With technology such as a portal, it can be challenging to know which steps to take next, what to implement and how to support the operations behind it. Completion of the scorecard can lead portal leaders through helpful considerations and the first steps in strategizing their portal roadmap.

Limitations

Lack of Existing Research to Compare Results

The following were limitations of this research study. First, there is limited research that is specifically geared toward studying the likelihood of increased use of a patient portal outside of demographic studies. Therefore, it took reviewing studies of various types – those looking at engagement, technology acceptance, etc. – to gather data for the literature review. Further, studies published after 2010 were eligible for inclusion in the data analysis. Although 2010 is not far in the past, much has changed in the world of health care technology since that time. It is possible that features weren't ranked as highly simply because they are newer technology, weren't studied shortly after 2010 or weren't even a technology the industry had in mind.

Small Sample Size

Second, for the purpose of this study, 10 organizational interviews were conducted via phone – a small sample size. It would be helpful to collect data from a larger sample size.

Selection Bias

The contacts helping connect with potential interviewees were personal contacts. In addition, they knew the individuals they were reaching out to. As such, the sample was not random. Further, it is possible that organizations provided by OpenNotes.org were

inherently more engaged in portal operations at their organization, since they are at the forefront of providing access to patient notes via their portal. This could have affected their input.

Lack of Direct Patient/Primary User Input

Further, these interviews were conducted with key representatives from the organizations. It would also be helpful to connect with patients from these organizations. That was out of scope for this study and would be a good follow-up effort.

Conclusion

Patient portals are electronic tools patients can use to engage in their care. With a growing population needing access to care in the United States, tools like patient portals can be important to facilitating patient care, potentially improving patient outcomes and increasing access to care. However, researchers are still defining portals' effect on patient care. Some cite improved outcomes and clinical and process improvements, with others showing little to no clinical benefit. That said, one thing is clear: any potential benefits of portals will not be realized if patients do not actually use them. Unfortunately, the goal of patient adoption of portals comes with many barriers (e.g., patient access to broadband or cellphones, literacy and technology acceptance).

Despite these barriers and the mixed results from the literature around this technology, portals have become increasingly common in health care settings, as organizations look to engage with their patients electronically, meet Meaningful Use and have the technology patients coming from the consumer world of online banking, etc., expect.

However, patient portals can be both technically and operationally difficult to implement. Further, as health care organizations move forward in the evolution of their

portals, they are faced with the challenge of budgeting for portal advancements among many projects.

Having a clear scoring approach to evaluate a portal based on likelihood of patient use, the development of which was the purpose of this research effort, will assist organizations in evaluating a patient portal based on acceptability and use by adult patients receiving care at health care systems or hospitals.

Through development of the scorecard via analysis of data from an academic literature review and 10 qualitative interviews, it was found that portal use is determined by much more than only features. Features are key; however, it is also important to ensure that the portal is personalized to the user, user friendly, patients can access it and have assistance using it, patients understand the content and can accomplish key tasks, and the organization has operational support for the portal. These elements create a holistic picture of increasing patient use of a portal and contribute to patient initial enrollment in/adoption of a portal and sustained use.

The resulting scorecard from the data analysis considers this holistic picture and is divided into several areas: features, design, content understanding, technical aspects and assistance, and operational considerations. Using this scoring approach may lead to improved design and implementation of a portal, leading to increased use and, thus, the potential positive impacts patients may receive from engaging electronically in their care.

EXECUTIVE MEMORANDUM

TO: HEALTH CARE SYSTEM LEADERSHIP

SUBJECT: APPLYING A SCORECARD TO A PATIENT PORTAL TO DETERMINE LIKELIHOOD OF USE BY PATIENTS AND DRIVE PLANNING FOR FUTURE ENHANCEMENTS

Much still needs to be learned about the effects of portals – secure, online tools patients can use to engage in their own care – particularly how to increase technology acceptance and their actual use. Health care systems and hospitals are faced with competing priorities when it comes to technology planning, and this remains true for patient portals. However, how can organizations go about evaluating their patient portals to help them develop a technology strategy for this tool? There is a need to develop a scoring system for evaluating patient portals based on the likelihood of patients using them assist in this challenge.

The purpose of this research effort was to develop such a scorecard to arm health care leadership with the ability to strategically design and implement patient portals that patients will use.

An academic literature review was conducted, and10 qualitative interviews were held with health care leaders throughout the United States to understand their portal efforts and perspectives.

The resulting scorecard is divided into several areas, including features, design, content understanding, technical aspects and assistance, and operational considerations. Organizations receive a score for each section and an overall score. Using this scoring approach may lead to improved design and implementation, leading to increased use and, thus, the potential positive impacts patients may receive from engaging electronically in their care.

Appendix 1: Academic Literature Review and Interviewee References

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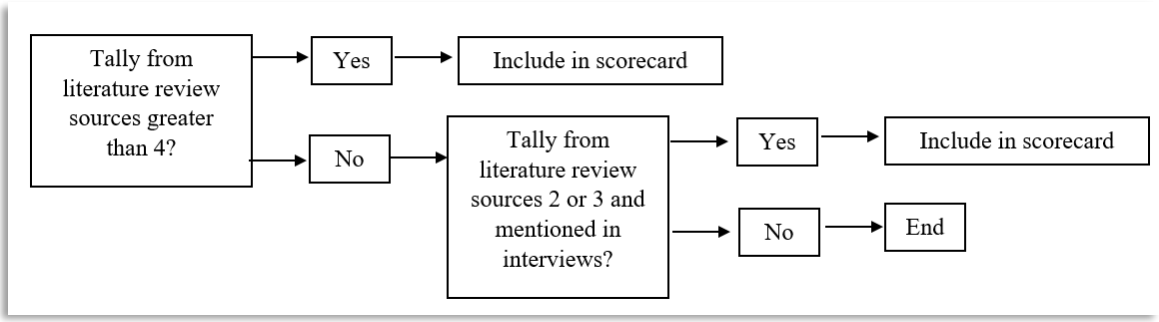
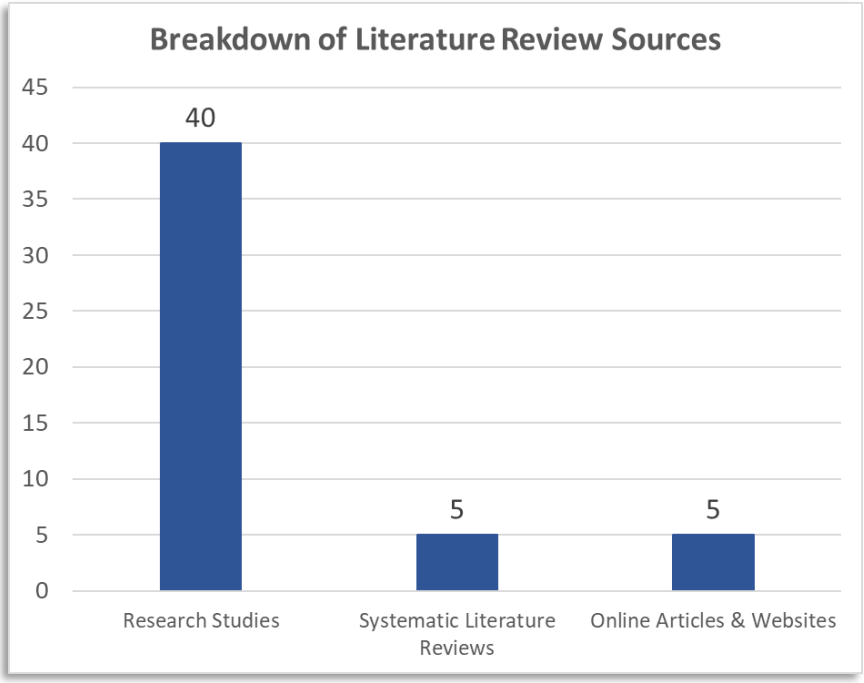
Appendix 3: Visuals, Tables and Interview Guide3

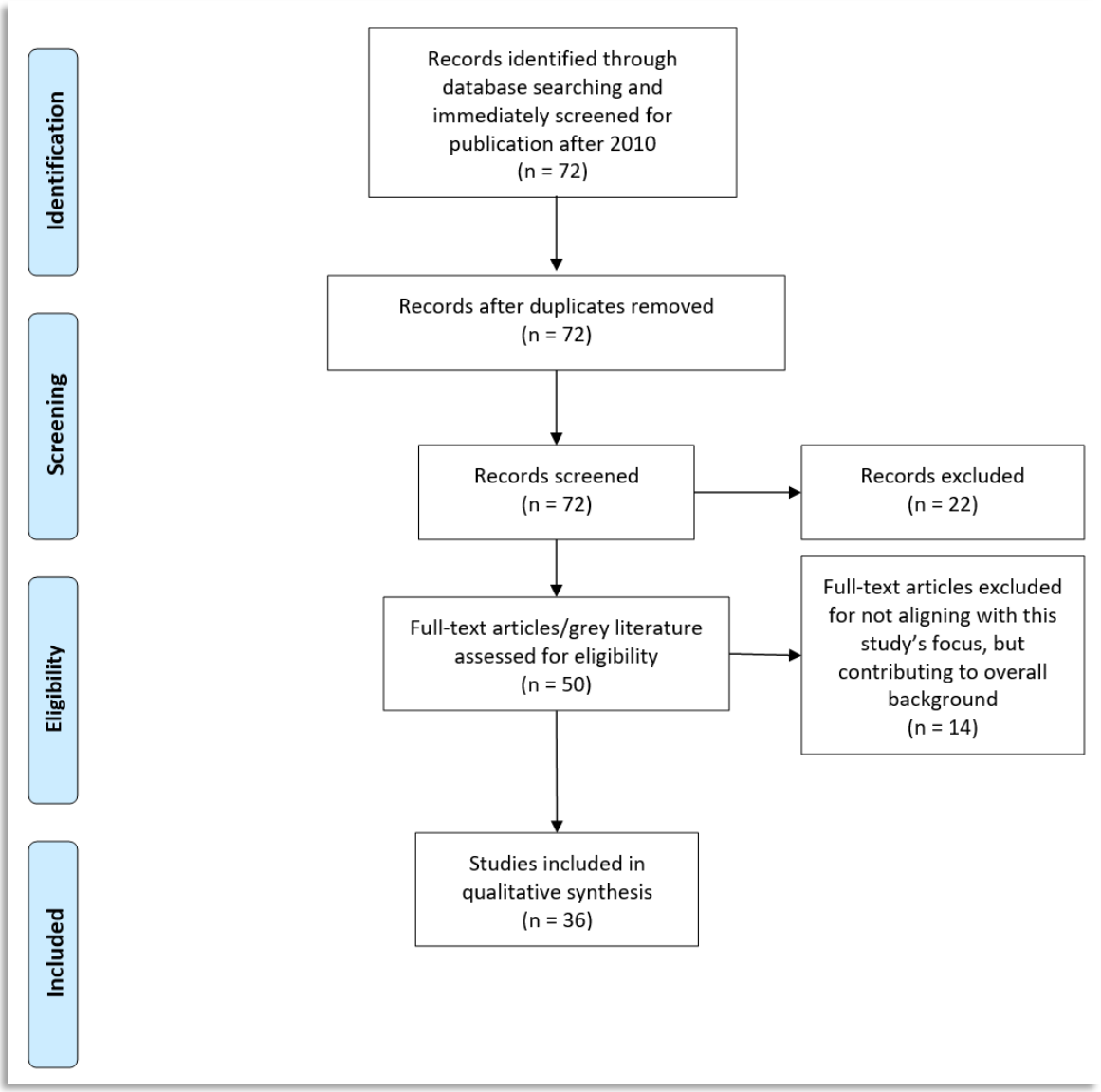
Visual 1: Inclusion in scorecard



Visual 2: Literature review sources

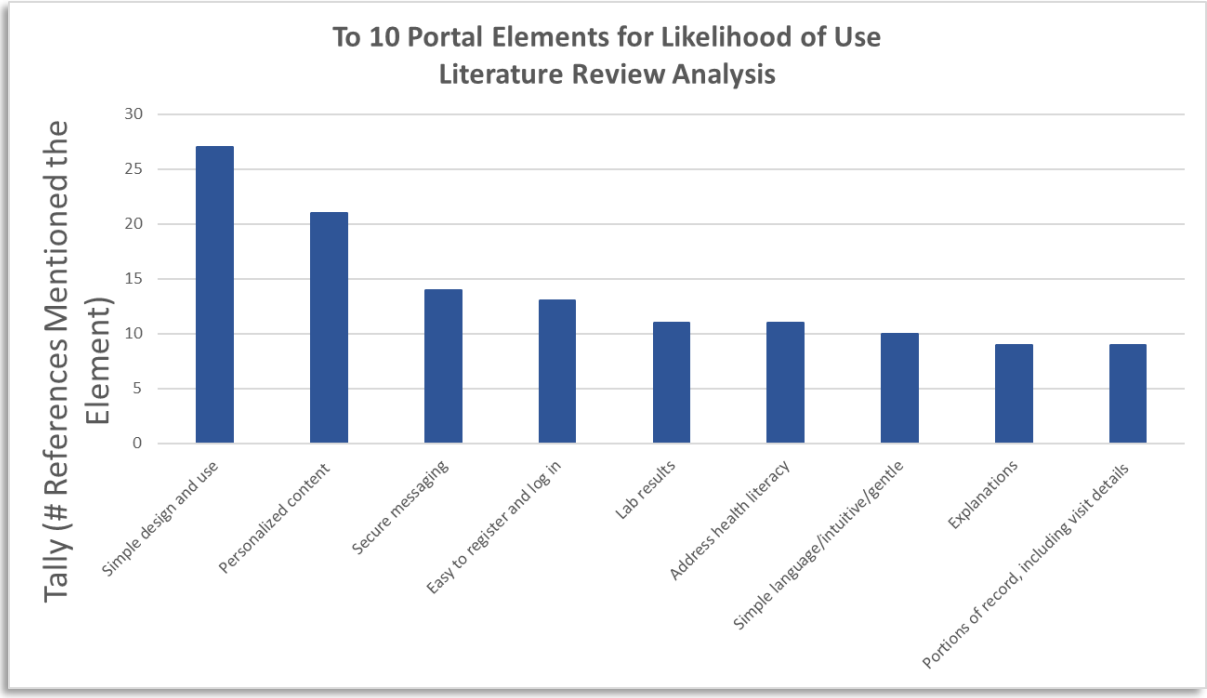


Visual 3: Reference Study Eligibility

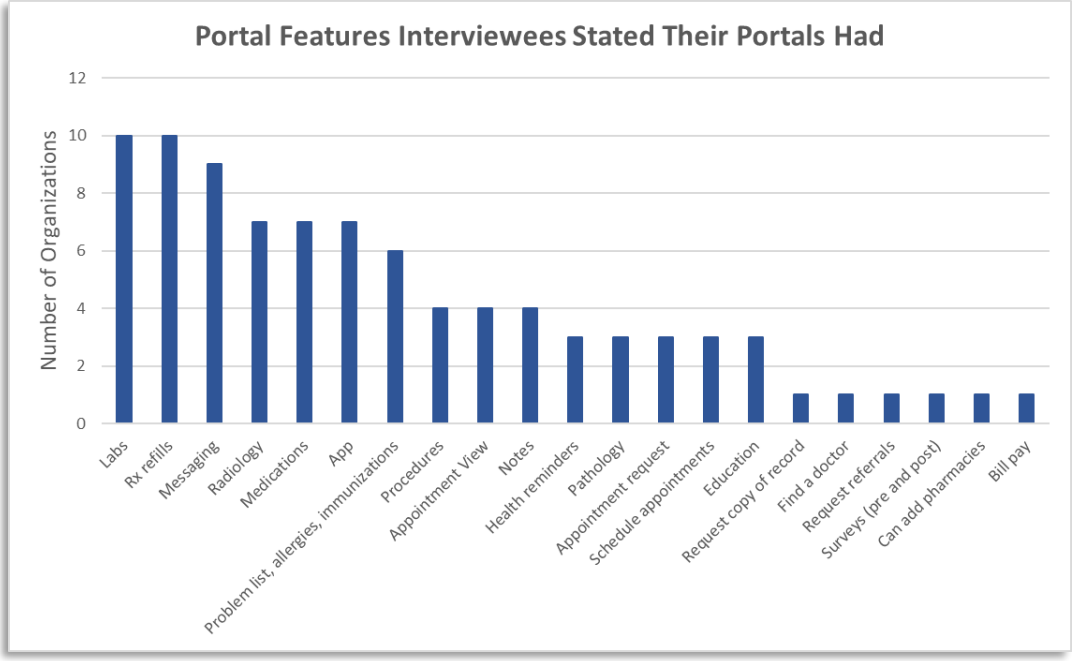


[34]

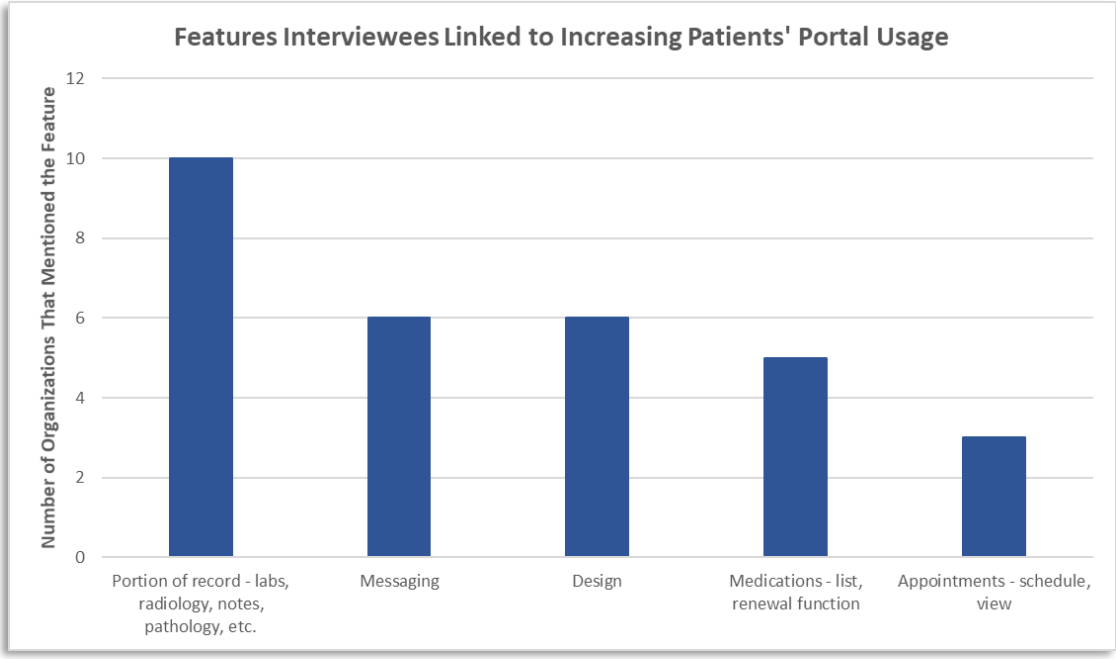
Visual 4: Top 10 portal elements for likelihood of use from the literature review analysis



Visual 5: Features interviewees noted were available in their portals



Visual 6: Features interviewees noted were associated with patients' likelihood to use their portal



Visual 7: Portal – Patient Likelihood of Use Evaluation Scorecard

Enter 1 or 0 for each element. Each section is allocated its own score (i.e. a percentage of available points, with the aggregate score being an average of all the section scores).

Portal - Patient Likelihood of Use Evaluation			
	Available Points	*Directions: Input 1 or 0*	Points Earned
Features			
Personalized Education	3		0
Care Plan - Recommendations, Next Steps, Goals	3		0
Secure Messaging	3		0
Results - Labs, Radiology, Pathology	3		0
Notes and Visit Details	3		0
Prescription Renewal/Refills	3		0
Medication Summary	1		0
View Appointments	1		0
Appointment Reminders	1		0
Scheduling	1		0
Features Score			**0%**
Design			
Large font	3		0
Images and illustrations	3		0
Icon driven	3		0
Structural features/graphical elements set off design	3		0
Assistive technology (vision impairment help)	3		0
Simple and easy to use	3		0
Involved patients in design and testing	1		0
Design Score			**0%**
Content understanding			
Disease information	3		0
Terminology dictionary	3		0
Medication and side effect explanation	3		0
Test purpose and interpretation	3		0
Simple language that is gentle and intuitive	3		0
Content understanding score			0%
Technical aspects & assistance			
Easy to register and log in	3		0
Browser agnostic	3		0
Single portal for the organization	3		0
Limited downtimes	3		0
Technical support available	1		0
User training	1		0
Security assurances to patient	1		0
Technical aspects & assistance score			0%
Operational			
Patient awareness campaigns	3		0
Involvement of providers in portal launch and sustainment	3		0
Operational score			0%
Overall score			0%

Table 1: Literature Review: Main Focuses of References

Focus	***Tally***	***% n=50***
Effect on patient as a health care consumer (e.g., activation, engagement, loyalty)	3	6%
Effect on patient outcomes, delivery of care and use of services	8	16%
Effect on clinical workflow	3	6%
Background grey literature on health care technology and open notes	2	4%
Barriers to portal adoption (e.g., health literacy, demographics)	10	20%
Portal technology acceptance and patient preferences	24	48%

Table 2: Literature review data analysis by features, design and organizational adoption, and operational efforts

Reponses	***Tally***	***% n=36***
Features		
Personalized content that helps with disease management (messages, education, recommendations, next steps, treatment goals, care plan)	21	58.33%
Secure messaging	14	38.89%
Lab results	11	30.56%
Explanations: Disease information and terminology dictionary; medication and side effects; test purpose and interpretation (link to more info)	9	25.00%
Portions of record, including visit details (notes, summary)	9	25.00%
Rx renewal	8	22.22%
Interactivity (diary, patient-generated data)	6	16.67%
Security assurances	4	11.11%
Appointment scheduling	3	8.33%
Proxy access to many at once	3	8.33%
Medication summary	3	8.33%
Add value; don't compete with what is already out there	2	5.56%
Appointment reminders	2	5.56%
Upcoming appointment summary	2	5.56%
Available as an app	2	5.56%
Referrals	1	2.78%
Summary of care team	1	2.78%
View bills and make payments	1	2.78%
Socially communicate with others with similar conditions	1	2.78%
Medication reconciliation	1	2.78%
Comparison to other patients	1	2.78%
Input information about who can manage your care	1	2.78%
Learn about research opportunities	1	2.78%
Design and Organizational Adoption		
Simple design and use (easy to use, no usability issues, large font, images, single portal entrance/no multiple portals, browser agnostic, assistive technology for things like vision impairment, icon driven, structural features set off design/graphical elements, technical up time)	27	75.00%
Easy to register and log in	13	36.11%
Address health literacy	11	30.56%
Simple language/intuitive/gentle	10	27.78%
Involve providers in adoption	6	16.67%
User testing & involvement in design	4	11.11%
Address numeracy skills	3	8.33%
Printer-friendly summaries and information	2	5.56%
Email functions like print, spell check, formatting	1	2.78%
Assess organizational readiness and patient needs	1	2.78%

Operational Efforts		
User training	8	22.22%
Tech support	5	13.89%
Awareness promotion	4	11.11%
Sustained use key	2	5.56%
Unbiased invitations (invite everyone)	1	2.78%

Table 3: Interviews were conducted with:

Organization	Representative	Of Note
Billings Clinic *(Montana)*	Patti Reisinger, RHIT, CCS, Director, Health Information Management	• Covers much of Montana, western Dakotas and northern Wyoming • Multi-specialty group practice • 304-bed hospital • Level III trauma center • Skilled nursing and assisted living facility • About 4,000 staff, including more than 400 providers • 11 affiliates
Fort HealthCare *(Wisconsin)*	LaBebe Nickell, CIO; Christopher Manakas, MD, CMIO	• Only hospital in Jefferson County, Wisconsin, a rural area • 72-bed hospital • Ambulatory surgery and specialty clinics • Employed provider base of 50, with most active medical staff being employed
Geisinger Holy Spirit *(Pennsylvania)*	Richard Schreiber, MD, FACP, CMIO	• Community hospital sponsored by Sisters of Christian Charity • Behavioral health, breast care center, cancer center, cardiac rehab, family medicine and other specialties • Recently purchased by Geisinger • An estimated 550 providers on medical staff
Grady Health System *(Georgia)*	Daniel Wu, MD, CMIO	• Includes Grady Memorial Hospital, known for its trauma center, and six other facilities • One of larges public health systems in United States • Physicians are faculty at Emory University and Morehouse • An estimated 600 physicians active on a daily basis, with potentially 1,000 credentialed
MedStar	Kevin Coakley, Director, myMedStar Patient Portal	• 10 hospitals • Urgent care

(Maryland and D.C. area)		• Ambulatory care • Estimated 30,000 employees • Estimated 6,000 affiliated physicians
Memorial Hermann *(Texas)*	Alan Weiss, MD, CMIO and Associate Vice President Ambulatory Services	• 16 hospitals • Specialty programs • Teach hospital for McGovern Medical School • 24,000 employees • 5,500 affiliated physicians
Piedmont Healthcare *(Georgia)*	Robert Budman, MD, MBA, CMIO	• 7 hospitals • 19 urgent care centers • 94 physician practice locations • 1,615 Piedmont Clinic members • 16,500 employees
UAB Medicine *(Alabama)*	Jorge Alsip, MD, CMIO	• Academic health care system with hospitals and clinics • Rough estimate of 1,600 providers (800 residents, 800 attendings) • Rehab hospital • Behavioral health hospital • Women's and children's hospital • Six affiliates
UHS of Delaware, Inc. *(Across United States)*	Marreddy (Reddy) Yeruva, MD, Assistant CMIO; Mike Meall, Manager, Information Services	• 28 acute care hospitals in three regions across the United States – East, Central, West • Additional facilities in Puerto Rico, U.S. Virgin Islands and United Kingdom • Some primary care and ambulatory care practices • 81,000 employees
Veterans Health Administration *(Across United States)*	Susan (Sue) Woods, MD, MPH, Past Veterans Health Administration with recent roles as Associate Chief of Staff, Informatics & Research, VA Maine; and Director of Patient Experience, Connected Care Office	• 1,233 health care facilities, including 168 medical centers and 1,053 outpatient sites • Serves more than 8.9 million Veterans annually

	Current founder and principal at HiTecHiTouch, LLC	

[13, 35-53]

Table 4: Qualitative Interview Results

Reponses	***Tally***	***% n=10***
Organizational Activities		
Actively track enrollment	8	80%
Track who is using the portal (e.g., age)	4	40%
Track how patients use the portal	6	60%
Seek patient sentiment	6	60%
Features Available on Their Portals		
Labs	10	100%
Rx refills	10	100%
Messaging	9	90%
Radiology	7	70%
Medications	7	70%
Available as an app	7	70%
Problem list, allergies, immunizations	6	60%
Procedures	4	40%
Appointment view	4	40%
Notes	4	40%
Health reminders	3	30%
Pathology	3	30%
Appointment request	3	30%
Schedule appointments	3	30%
Education	3	30%
Request copy of record	1	10%
Find a doctor	1	10%
Request referrals	1	10%
Surveys (pre and post appointments)	1	10%
Can add pharmacies	1	10%
Bill pay	1	10%
Features Felt Were/Would Be Associated Increasing the Likelihood of a Patient Using a Portal		
Portal of record – labs, radiology, notes, pathology, etc.	10	100%
Messaging	6	60%
Design	6	60%
Medications – list, renewal function	5	50%
Appointments – schedule, view	3	30%

Table 5: Summarized statements of note from qualitative interviews

Features Patients Want and Use; Predictors of Use
Features used most: Highest used is test results and second is secure email and Rx refills. Very few care about allergy lists and after-visit summaries. **Predictors of use:** Broadband at home, comfort with Internet, frequency of using the Internet. **What patients want and increasing likelihood of use:** Patients have wanted records, test results. Some of the most difficult comments have to do with usability and navigation. There is a five-step journey to portal value. Starts with knowing about it. Then, knowing that it has value – combination of physician/nurse/friend saying you should use it or they try it out and find out that it is helpful to them. Then, the tool has to be usable and well-designed or they will give up. We have a bar for passwords for security the same level as care team to get into the portal, which can't do for consumers. Must make passwords easy. It has to meet people's needs. It could be the best portal in the world with best design, but if doesn't meet needs, won't have usage.
Why Patients Do Not Use the Portal and Negative Feedback
Patient feedback: Difficult to navigate and find things. Items are not labeled intuitively. Multiple clicks. If had ability to request more appointments, would use it more. Not intuitive. Need to provide more education on where to find things. **Reasons why patients do not use the portal:** Too troublesome, don't know how to use computers **Feedback from patients:** Continuity of care documents are poorly organized. There are headers, but the content is sequenced poorly and either has not enough information or way too much. Need to design in a meaningful way. **Reasons why patients do not use the portal:** Had some difficulty in the past with trying to aggregate two records into one, been some inaccuracies. Those have been corrected, but it has taken time to shake that perception. Dated looking and not all the HTML capabilities that a modern version should have. **Reasons why patients don't use the portal:** Computer skills. Computer challenges – can't log in. Initially had issues with multiple enrollment messages to those who had already enrolled. **Why patients do not use the portal:** When we were running campaigns to engage patients, biggest challenge was when we sent invitation, they would

be rounded on – couldn't remember email address and password. Tech barrier. "I don't feel like it. I'm too sick. Technological barrier."
Organizational Efforts
Portal challenge: One of the things we have struggled with is having a consistent operational leadership around portal strategy. It has been a challenge to pull someone away from their primary responsibility. **Organizational operational support:** Steering committee that meets monthly/every other month – review where are, new functionalities and where would like to go. **Increasing engagement:** Had a surge in hospital engagement due to liaisons assisting patients; watched unique visits climb. **Usability:** Created some tutorials that are available. A lot of calls to help desk on how to accomplish tasks. Analysts created PDF tutorials to guide patients through. **Future enhancement:** Working to connect all patient apps – portal, bill pay, scheduling – into a single app. **Guidance on increasing engagement:** Re-phrase your messaging to patients to if they want to see their records versus if they want to access the portal.

[13, 35, 37, 39, 41, 43, 45, 47, 49, 51]

Interview Guide

Name: **Title:** **Organization:** **Interview Date:**	
Basic background information (to be completed ahead of time via web search and verified during interview)	
Type of organization (profit, non-profit, academic) Size of organization (number of hospitals, number of clinics) Location (state)	
Portal background	
Who is your portal vendor?	
When did you first launch your portal?	
What are the features of your portal?	
How do patients access your portal (web, mobile app)?	
Demographic background	
How many patients are enrolled in your portal? # and percent of total patient population	
What is the demographic background of those patients enrolled in your portal?	
If you measure engagement in your portal, how? And what is the engagement?	
Of those patients who typically use your portal, what are their common characteristics (e.g., demographics or more specific, such as have a chronic disease)?	
What is the average access rate of those patients using the portal?	
What features that are view-only (i.e., they can see information, but not do anything with it) are patients accessing most frequently?	
What features of the portal that are view-only are patients accessing least?	
What features that allow patient interaction (e.g., they can modify something or engage with their care team, such as prescription renewal, updating demographics, adding health information, sending messages) are patients accessing most frequently?	

What features of the portal that allow patient interaction are patients accessing least?	
Patient Sentiment	
What tactics have you used to collect patient sentiment for your portal? For example, online surveys, person interviews, focus groups.	
Have you sought feedback from non-portal users, as well as portal users? If not, why?	
What are the reasons patients provide for why they use your portal?	
What are the reasons patients provide for why they do not use your portal?	
What feedback have you received on areas of opportunity for your portal from patients?	
What feedback have you received on the features of your portal that patients most appreciate?	
What feedback have you received on the usability of your portal?	
What feedback have you received on patients' ability to understand the content of your portal?	