

Patient Engagement Using a Patient Portal in a Clinical Research Hospital

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DNP Scholarly Project

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United States spending on healthcare is astronomical. Nearly 66% of the costs are attributable to patients with multiple chronic conditions (U.S. Department of Health and Human Services, 2014) and the estimated costs of cancer may reach \$158 billion by 2020 (Mariotto, Yabroff, Shao, Feuer & Brown, 2011). It is vital to address any avenue that can decrease these costs and improve outcomes. Meanwhile, growth of adult internet usage from 2000 to 2015 increased from 52% to 84% (Perrin & Duggan, 2015). According to Fox and Duggan (2013) from the Pew Research Center, 59% of adults use the internet to find health information with 53% actually talking to their providers to validate their online findings. Furthermore, 41% of adults are using the internet as a diagnostic tool to self-diagnose and getting confirmation from their provider. This is not surprising considering two-thirds of Americans have a smartphone and the less-advantaged are more likely to be dependent on their smartphone with 62% using their phones to look up health information (Smith, 2015).

In 2009, the American Recovery and Reinvestment Act (ARRA) was signed and part of this act was the Health Information Technology for Economic and Clinical Health (HITECH) Act. The HITECH Act authorized the Meaningful Use (MU) program which encourages the widespread adoption EHRs by offering financial incentives and technical assistance to healthcare org that use EHR “meaningfully” (Meaningful Use [MU]) —that is, the use of certified EHR technology. The goal of MU is to improve quality, safety, efficiency, and reduce health disparities; engage patients and families; improve care coordination, population and public health; and maintain the privacy and security of patient health information (Conway, 2013, paragraph 4). One way patients can access their health information and engage with healthcare providers is through the patient portal (The Office of the National Coordinator, 2015). Patient

portals have evolved from simple online tools to access clinical documentation to more robust applications where the patients and caregivers can interact using a secure communication channel (eMessaging) and send requests for medical appointments and medication refills. Many healthcare organizations are using portals as an additional means to engage their patients and deliver quality care. The Centers for Medicare & Medicaid Services (CMS, 2016) describe patient engagement as a collaborative partnership between the patient and care team that may improve outcomes. According to the Agency for Healthcare Research and Quality (AHRQ, 2013), patient satisfaction and outcomes are influenced by patient engagement.

The purpose of this scholarly project was to implement and evaluate the impact of an updated patient portal on the patient experience and portal utilization in a clinical research hospital. The project took place in a medium-sized academic medical center dedicated to clinical investigation. This clinical research hospital treats a relatively high number of patients with chronic disease and cancer. There was a patient portal that was implemented in 2013, but it had very limited functionality that allowed patients to only view visit summaries, discharge instructions, and some lab results. There were 14,833 registered portal participants who used the original portal, however, only 3,881 were active users. The hospital implemented a new, more robust portal in 2017. Besides the ability to access multiple organizational portals from one portal, the new portal offers a mobile application and more importantly, secure health messaging and improved visit not usability. The potential significance with this implementation is improved engagement, communication, and patient satisfaction.

Theoretical Framework

King's theory of goal attainment (TGA) is the theory that was used to guide this implementation (see Appendix A). TGA was developed from of her conceptual system

framework based on the premise that people are continuously interacting with the environment (King, 2007). The TGA focuses on the interpersonal interactions and resulting transactions and the concepts epitomize the utilization and value of the electronic patient portal. Her theory fits well with the MU requirement for the electronic interaction of patients with their care team.

The operationalization of patient engagement using the electronic patient portal are the result of goal attainment from clinician and client transactions and satisfaction when goals are attained (King, 1992). In King's TGA, patient engagement is illustrated by knowledge and satisfaction as a result of transaction. The clinician and patient can use the electronic patient portal to communicate and interact with each other and make health-related transactions. For example, a provider can communicate and engage with a patient about their lab values and recommend interventions to improve outcomes. This communication can help the patient agree to take action on the interventions (goal setting) and implement the interventions (transaction), resulting in patient satisfaction when the patients' goals are accomplished. This description of operationalizing King's TGA supports her assertion that transaction fosters goal attainment and can lead to satisfaction (King, 1997).

Literature Review

Portals have increasingly gained interest, becoming more available since the inception of Meaningful Use (MU) and the mandate of various requirements that can be incorporated into this tool (Irizarry, Dabbs, and Curran, 2015). Due to the fast rate of progress with technology, constant review of recent literature will be important to identifying the specific aspects of patient portals that can help improve patient engagement and outcomes. In order to better understand patient portal trends and outcomes, recent literature was appraised (see Appendix B). The

literature shows the importance of patient populations, personalization, and communication when deploying a patient portal.

Systematic Reviews

Findings from several systematic reviews showed indications for increased portal use with personalized features and highlighted areas for research and improvement. Irizarry, Dabbs, and Curran (2015) reviewed and analyzed 120 studies from 2006 to 2014 to understand patient engagement through the patient portal. In their analysis they found several common themes that included user acceptance, personalization, and shared communication. Out of the 62 articles focused on acceptance, they found patients with disabilities, chronic illnesses, frequent utilizers of health services and caregivers of the elderly and children are most interested in portals, which is similar to the main demographics at the scholarly project site. Three randomized controlled studies were identified and focused on tailored interventions (i.e. care plans and decision support), which resulted in improved engagement. The authors identified secure messaging as a patient portal communication method that has the most promise to affect the patient-provider dynamic. In another systematic review, researchers analyzed 27 studies from 2004 to 2014 in an effort to assess portal use, the similarities of patient portal populations and isolate areas of improvement (Scott Kruse, Argueta, Lopez, & Nair, 2015). Thirty-three percent of the studies showed increased self-management of chronic disease with portal use. Improved communication (41%) and favorable attitudes towards messaging (37%) were also reported as positive aspects of the patient portal.

Randomized Controlled Trial

Fiks and his colleagues conducted a six-month randomized control trial (RCT) (2015) that used a portal in a primary care setting, specifically with a pediatric asthmatic population.

Findings showed patient portals were effective in improving the ability to manage asthma and reduction in the number of flares, patient activation and satisfaction. In the group that received portal access, 57% of the patients used the portal five out of six months, 92% were satisfied with the portal and they also reported a decrease in asthma flares ($P=.02$). In addition, the children in the intervention group had less missed days of school, hospitalizations, emergency department visits and asthma provider visits. This study highlights the excellent utility and potential that portals offer to patients with chronic disease.

Retrospective Studies

A few retrospective studies demonstrate the importance of portal functions such as secure messaging and results viewing. Gerber et al. (2014) examined patient portal pervasiveness and trends analyzing usage data from 2007 to 2012 in a large outpatient cancer center ($N=6495$). The results of this study showed high and growing utilization with average log-ins doubling each year. From 2007 to 2012, patient enrollment multiplied by five and overall patient log-ins multiplied by ten. The frequent portal actions taken by these patients included looking at test results (37%) and secure messaging (29%). Approximately one-third of portal activity occurred during non-clinic hours.

In another retrospective study, Fleming, Cullen and Luna (2015) examined patient activation and engagement with portal use among hypertensive and diabetic patients. This study includes a total of 187 patients who were treated in a primary care clinic between 2012 and 2013. All patients engaged with their care team via the patient portal and the study found they were using the secure messaging feature significantly more than other portal features ($p < .05$). It was also found that more female patients ($n=112$) used the portal than males ($n=75$). This study

further reinforces the utility and feasibility with the scholarly project site population and advanced portal feature of secure messaging.

In summary, findings from the studies in this review indicated the significance of patient portal use in primary care and high prevalence secure message use with various patient portals. Studies supported the use of the portals with chronic disease and cancer patients, and showed promise with improved outcomes (Fiks, et al., 2015; Irizarry, Dabbs, and Curran, 2015) and indications for increased use with personalized features (Fiks, et al., 2015; Irizarry, Dabbs, and Curran, 2015; Scott Kruse, Argueta, Lopez, & Nair (2015). Although the results of these studies are encouraging, generalizability of studies are limited due to the types of studies, which lack RCTs. Thus, more studies are needed to test the effects of patient portals on health outcomes using RCTS.

Methods

Design, Sample and Setting

This project was a healthcare information technology quality improvement project. The project was conducted at a medium-sized academic medical center on the East Coast that treats mainly adult patients enrolled in a clinical research protocol. The convenience sample consisted of approximately 14,833 adult outpatients and discharged inpatients that have registered and activated patient portal accounts.

Procedures

The project was implemented over the course of ten months in accordance with the Scholarly Project Timeline (see Appendix C). Two months prior to the implementation, a link to an anonymous, voluntary patient portal survey was posted to the login page of the patient portal. In addition, patients who were already registered to use the patient portal were emailed a link to

the same voluntary survey. Four weeks after the survey was sent, all portal patients were sent a reminder.

The updated patient portal was configured and prepared over the course of several months. The new features included secure messaging, the ability to view other non-project site organizations or providers who used the same portal, native mobile application, and improved usability for viewing and sending documents. Another addition was the ability to view patient appointments. Patients were sent instructions on how to use the new portal and they were also posted on the new portal site.

One month after the completion of the first round survey, the project site activated the new electronic patient portal. The old portal site was available for only one month after the new portal was turned on. Five months after the new portal was launched, all original and newly registered patients were sent an email with a link to complete the voluntary survey. At the end of the fifth month, the second round of surveys were made available through the patient portal accounts and an electronic message was sent to all portal participants. Reminders were sent two weeks and four weeks after this message.

Instrument and Data Collection

The survey used a modified version of the Health Information Technology (HIT) item set that is offered as part of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey, which measure the patient experience by organizations who participate in value-based purchasing initiatives offered by CMS (CMS, n.d.). The survey (AHRQ, 2012; McInnes et al., 2012) was composed of 18 structured questions, including fourteen items on a 4-point Likert scale and four items with yes/no options, one multiple choice question and five basic demographic questions (see Appendix D). This survey measures patient satisfaction in the

following domains: timeliness of answers to medical questions by e-mail, helpfulness getting healthcare information about tests and care from the organization's website and getting timely appointments by email or the website (AHRQ, 2011). Additionally, a free-text comment section was added to the end of the survey. The face validity of the survey was assessed by the organization's subject matter experts, which consisted of a senior member of the quality department and the chief of the health information management departments. The survey was an anonymous online survey administered via the patient portal.

Data Analysis

Demographics and other descriptive data were analyzed using descriptive analysis. Pre- and post-group differences were tested using independent t-tests for continuous variables and chi-square for categorical variables. Statistical Package for Social Sciences (SPSS) software was used for data analysis. All patient comments were reviewed by the DNP project leader and the organization's Chief of Health Information Management.

Protection of Human Rights

The DNP project leader requested a consult with the project site's Office of Human Subjects Research Protections. Institutional Review Board (IRB) approval was obtained from the project site and University of Maryland. This project did not qualify for Human Subjects Research as it is categorized as quality improvement, but it is subject to IRB classification (Bonnell & Smith, 2014). All participants were informed that the survey was voluntary and anonymous. They were also instructed that their completion of the survey signified informed consent. The surveys were managed with a third-party online survey application. Data was not identifiable and URL addresses were protected.

Results

There were 1849 respondents in the pre-implementation survey and 2003 respondents in the post-implementation survey. When patient demographics were compared between two groups, both were similar (Appendix E). Most of the participants in both groups were age 55 years or older (pre, 76% [n=1825]; post, 70% [n=1984]) and male (pre, 51.3% [n=1795]; post, 51.4% [n=1966]). The majority had at least a college degree (pre, 72.3% [n=1819]; post, 73.3% [n=1969]) and were white (pre, 87% [n=1788]; post, 89.1% [n=1925]).

In the pre-implementation survey, more than half (58.5%) reported that they used the portal for 2-3 years. Among those, 67.6% reviewed lab results using the portal and 11.8% (n=219) viewed visit notes online. However, many (63.0%) did not know or were not offered visit notes. In the post-implementation survey, more than half of the participants (58.8%) used the portal for 1 year or less. Data from the portal usage summary showed that 6.8% of patients (551 out of 8127) used secure eMessaging (a new feature). The majority (81.5%) of survey participants reported that they reviewed lab results via patient portal and 20.3% (n=407) viewed visit notes online.

Independent t-tests (see Appendix G) were conducted to compare the frequencies of provider communication, ease of use regarding results and visit notes, and availability of results before and after the updated portal implementation. Pre- and post-implementation, survey scores show a slight insignificant decrease regarding emailing providers and getting answers to medical questions as soon as they were needed (pre M=3.06, SD=1.23; post M=3.05, SD=1.23; $t=.04$, $p=.97$). Scores slightly increased for how often were emailed questions answered (pre M=3.09, SD=1.20; post M=3.11, SD=1.23; $t=.24$, $p=.81$). However, scores increased significantly for the questions that addressed how often was it easy to find lab or other test results on the portal (pre M=3.03, SD=1.09; post M=3.29, SD=.88; $t=7.34$, $p<.0005$) ; how often were results put on the

portal as soon as you needed them (pre $M=3.01$, $SD=1.08$; post $M=3.32$, $SD=.87$; $t=8.79$, $p<.0005$); and how often were results presented in a way that was easy to understand (pre $M=3.07$, $SD=1.07$; post $M=3.16$, $SD=.92$; $t=.28$, $p=.005$). These results may suggest that the frequencies regarding viewing and understanding of test results significantly increased in the short time between the retiring of the old patient portal and implementation of the new patient portal. Although there was no significant difference regarding the ease of understanding online visit notes (Appendix H), there was a tendency that suggests the new portal was easier to understand (pre $M=3.45$, $SD=.69$; post $M=3.51$, $SD=.65$; $t=1.02$, $p=.309$).

Comments from each survey were also reviewed. As for the trend in the comments section of the first survey, patients reported dissatisfaction in the navigation and general lack of functionality, inability to communicate with providers online, no offers of visit notes, no option to view or book appointments online, and no mobile application to use on their mobile phones and tablets. The second round survey comments included requests for physician notes via the portal instead of on paper and the ability to see scheduled appointments. Patients also expressed some frustration with the functions around the lab and test results. Patients also admitted emailing their providers, but not through the patient portal secure messaging function. Finally, they did report satisfaction in the ability to use a mobile application on their smart devices.

This study has some limitations in study design. For example, the survey was an anonymous online survey, thus it could have been completed by a patient more than once. Participants included in the pre- and post-survey could have been different. The same patients who completed the initial survey may have opted not to complete the second round of surveys with the new portal. In addition, any new patients who received portal access in 2017 and completed the survey after the new portal was implemented did not complete the initial survey.

Finally, case-wise deletion was used in some of the analysis to address ranges of missing answers on the first survey (1.3%-41.3%) and the second survey (0.9%-43.9%).

Summary

In the case of this research organization, these results have shed light on the usability of portal functions for their patients. The findings from this project suggest that the new portal engaged patients in their care using eMessaging and can help improve the patient experience. Feedback about the lab and results view and functions have also been considerations to work with the vendor and development team, which can help personalize the experience. Future surveys will be sent to this patient population in order to gauge progress. Further studies are needed to identify strategies to improve usability of patient portals and assess their impact on patient outcomes. With the adoption of the electronic medical record across the country, patient portals have become an expectation for demand information by patients. Organizations must be mindful of the patient experience and their expectations in order to satisfy their needs and the ability to engage with their care teams, as they could affect patient outcomes.

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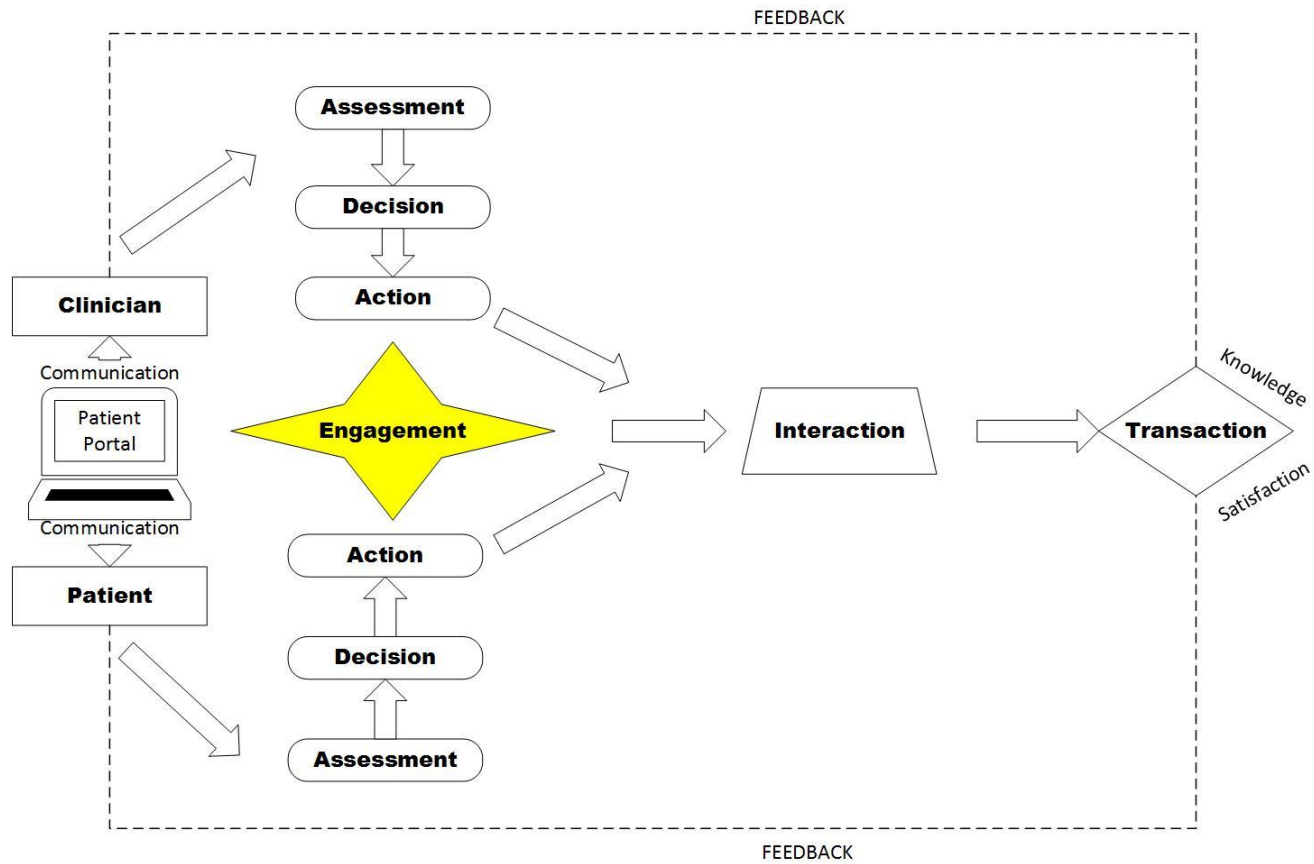
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Appendix A

Diagram of Patient Engagement Using the Patient Portal



Appendix B

Evidence Rating Table

Evidence Rating Table - Melnyk & Fineout-Overholt Rating and Grading Scales (2011)

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
Fiks,et al. (2015)	Evaluated the impact of the patient portal on outcomes (shared decision-making and satisfaction) in pediatric clinics with asthmatic patients	RCT	N=30 (each arm); 3 Pediatric Primary Care Clinics	-6 month randomized study -Outcome surveys at enrollment (after randomization) and at 3 and 6 months -Clinical outcomes included the number of asthma ED visits, hospitalizations, and specialist and primary care visits over the 6 months of the study assessed by parent responses to the 6-month outcomes survey -Parents also completed the Parent Patient Activation Measure to measure parent activation.	57% of parents in the intervention group used portal at least 5/6 study months. -Parents of children with moderate to severe persistent asthma used the portal more than others -92% were satisfied with portal	II C
Fleming, Cullen & Luna (2015)	Evaluated patient activation of their portal, assessed portal utilization among hypertensive and diabetic patients and explored a link between activation and patient engagement using the portal	Retrospective Cohort Study	N=187; (1) patients with hypertension, (2) patients with diabetes, and (3) patients with both hypertension and	-The number of times patients accessed their portal and the types of activity they performed within the portal were counted -Gender and observed frequency of use -Assessment of portal activity for hypertension, diabetes, and both	-A total of 112 females and 75 males activated their portal -The Chi-square analysis revealed that female patients were significantly more likely to activate their PWP (p <.05).	IV B

			diabetes.	conditions combined.		
Gerber, et al. (2014)	Determined predictors and patterns of use of a portal for accessing personal health information and communicating with health providers among cancer patients	Retrospective Analysis	N=6495	-PHR portal use is frequent and increasing among cancer patients -Univariable and multivariable regression models -All statistical analysis and data summarization were performed using R 2.6	-The most common portal actions were viewing test results (37%), viewing and responding to clinic messages (29%), and sending medical advice requests (6.4%) -Portal use was more common among men and white patients -Use was greatest for patients with upper aerodigestive malignancies (odds ratio [OR] 1.23; 95% CI, 1.00 to 1.52; P .05)	VI B
Irizarry, Dabbs, & Curran (2015)	Provided a summary of future patient portal research and development to meaningfully impact patient engagement.	Systematic Review	N=120 (studies)	120/440 articles met criteria.	Identified clear themes necessary to address in order to engage patients: Patient adoption, provider endorsement, health literacy, usability, utility, personalization, collaborative communication	V B
Scott Kruse, Argueta, Lopez, & Nair (2015).	Assessed portal use, the similarities of patient portal populations and isolate areas of improvement.	Systematic Review	N=27 (studies)	27/303 articles met criteria.	-33% of the studies showed increased self-management of chronic disease with portal use -Communication (41%) and messaging (37%) were also reported as improved with the patient portal	V B

Author,	Study	Strengths	Weaknesses	Quality
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year	objective/intervention or exposures compared			Rating
Fiks,et al. (2015)	Evaluated the impact of the patient portal on outcomes (shared decision-making and satisfaction)	<ul style="list-style-type: none"> -Randomized controlled trial -Clearly presented results in text, tables and figures. -No significant differences between study arms 	<ul style="list-style-type: none"> -No power analysis -Small convenience sample -Limited to pediatrics and asthma (limited generalizability) -Only in one health system focused on asthma -Instrument questions not validated 	C
Fleming, Cullen & Luna (2015)	Evaluated patient activation of their portal, assessed portal utilization among hypertensive and diabetic patients and explored a link between activation and patient engagement using the portal	<ul style="list-style-type: none"> Length of study (1 year) -Objective outcome criteria -Valid results -Results applicable to practice -Used Chronic Care Model as framework 	<ul style="list-style-type: none"> -Single site -Limited sample size -Generalizability minimal -Did not measure frequency of use of all functions within portal 	B
Gerber, et al. (2014)	Determined predictors and patterns of use of a portal for accessing personal health information and communicating with health providers among cancer patients	<ul style="list-style-type: none"> -Large sample -Length of time -Presented the data in clear tables and figures 	<ul style="list-style-type: none"> -Admitted to having some incomplete demographic data -Authors unable to differentiate between viewing of laboratory and radiology results -Limited generalizability 	B
Irizarry, Dabbs, & Curran (2015)	Provided a summary of future patient portal research and development to	<ul style="list-style-type: none"> -Identified clear themes -Detailed search strategy -Good explanation of exclusion criteria -Contained an abbreviated evidence rating tool (recent literature) 	<ul style="list-style-type: none"> -Did not include details of study characteristics addressing bias/validity -No discussion of limitations 	B

	meaningfully impact patient engagement.			
Scott Kruse, Argueta, Lopez, & Nair (2015).	Assessed portal use, the similarities of patient portal populations and isolate areas of improvement.	<ul style="list-style-type: none">-Detailed search strategy-Concise description of study summaries-Provided affinity matrix-Comparison to earlier similar review	<ul style="list-style-type: none">-No details about study strengths and weaknesses-No evidence ratings	B

Summary of Evidence			
Level of Evidence	Number of Studies	Summary of Findings	Overall Quality
2	1	<ul style="list-style-type: none"> • 57% of intervention group used portal for the majority of the study • Higher acuity patients parents used portal more often • 92% satisfied with the portal • Overall report of improved communication, asthma management and awareness • Intervention group reported decrease flares and less days of missed work 	C. Used an unvalidated instrument. Limited generalizability (asthmatic pediatric patients).
4	1	<ul style="list-style-type: none"> • Data showed female patients more likely to activate the portal than male patients • The most favored feature of the portal was the secure messaging function and findings were significant ($p<.05$) • Chronic diagnosis of hypertension versus diabetes or both predicted portal use ($p<.05$) 	B. Study over the course of a year. Valid results and applicable to practice. Used a Chronic Care Model for framework.
5	2	<ul style="list-style-type: none"> • Both systematic reviews that highlighted areas of research and improvement for patient portals • One study analyzed many more studies than the other • One study focused on themes, while the other presented statistics of theme frequency • Both reviews supported indications for increased use with personalized features 	B. Studies both had clear search strategies. They also presented clear themes. Both could have improved in explaining study limitations.
6	1	<ul style="list-style-type: none"> • The most common portal functions used were test result viewing (37%), secure messaging (29%) and medical advice questions (6.4%). • Younger, Caucasian patients with upper aerodigestive malignancies showed significant portal use. • 37% of log-ins and 31% of medical advice 	• B. Large sample and good length of study. Clear tables and explanations.

Summary of Evidence			
Level of Evidence	Number of Studies	Summary of Findings	Overall Quality
		questions happened during off-hours • Over the five year study, average log-ins doubled per year	

Melnik & Fineout-Overholt Rating and Grading Scales, 2011

Scholarly Project Timeline

Timeline	Semester	
	Spring-Fall 2016	Spring-Fall 2017
Consult with the Committee Chair and prepare discussion points with project site	February 2016	
Discuss project idea with project site and obtain approval and sponsorship	February 2016	
Submit scholarly project proposal to Committee	April 2016	
Scholarly project presentation	May 2016	
Consult with Office of Human Subjects Research Protection at project site	April 2016	
Consult with Committee Chair and submit project to IRB	May-September 2016	
Consult with site and Committee chair on final procedures	July 2016	
Send out initial survey	November 2016	
Send out reminder (after four weeks from initial request)	December 2016	
Conduct data analysis from survey and utilization reports		January 2017
Review results and Consult with Committee Chair		January 2017
Implementation and Go-Live of new patient portal ✓ Include instructions with registration and on portal site		January 2017
Send out second round of survey		July 2017
Send out reminder (after two weeks from second survey initial request)		July 2017
Send out final reminder (after four weeks from second survey initial request)		July 2017
Conduct data analysis from survey and comments		September-October 2017
Review results and Consult with Committee Chair		September 2017
Draft Summary of Findings and Recommendations		October 2017
Present to Project Site (key stakeholders)		November 2017
Complete report and disseminate manuscript		November-December 2017

Survey Tool (Adapted from the HIT Item of the CAHPS survey)

Item	Question	Answer Type
1	How long have you been using the patient portal?	Single Select from Year Range
2	Did you email this provider's office with a medical question?	Yes/No
3	When you emailed the provider's office, did you get an answer to an e-mailed medical question as soon as needed?	Likert
4	When you emailed this provider's office, how often were all of the questions in your e-mail answered?	Likert
5	Does this provider's office put blood tests, x-rays, or other test results on a website for you to see?	Yes/No
6	Did you look for your blood tests, x-rays, or other test results on the website?	Yes/No
7	How easy was it to find these lab or other test results on the website?	Likert
8	How often were these lab or other test results put on the website as soon as you needed them?	Likert
9	How often were these lab or other test results presented in a way that was easy to understand?	Likert
10	Visit notes sum up what was talked about on a visit to a provider's office. Visit notes may be available on paper, on a website, or by e-mail. Did this provider's office offer you visit notes?	Yes/No
11	How did this provider's office offer you the visit notes? Mark one or more.	Multiple Choice
12	Did you look at any visit notes from this provider's office?	Yes/no
13	How often were the visit notes easy to understand?	Likert
14	What is your age?	Single Select from Age Ranges
15	Are you male or female?	Male/Female
16	What is the highest grade or level of school that you have completed?	Single Select from Educational Levels

17	Are you of Hispanic or Latino origin or descent?	Yes/No
18	What is your race? Mark one or more.	Single Select
End	Comment Section	Free Text

Appendix E

Table 1

Demographics of Patients Surveyed about Their Patient Portal and Health IT Experience at a Clinical Research Center (1st survey N=1849, 2nd survey N=2003)

Demographic	N (%) 1 st survey	N (%) 2 nd survey	p-value
Age Range (years)			.302
18 to 24	26 (1.4)	32 (1.6)	
25 to 34	81 (4.4)	78 (3.9)	
35 to 44	185 (10.0)	167 (8.3)	
45 to 54	312 (16.9)	319 (15.9)	
55 to 64	587 (31.7)	640 (32.0)	
65 to 74	507 (27.4)	609 (30.4)	
75 or older	127 (6.9)	139 (6.9)	
Education			.667
8 th grade or less	3 (0.2)	2 (0.1)	
Some high school	11 (0.6)	8 (0.4)	
High school graduate/GED	104 (5.6)	125 (6.2)	
Some college/2-year degree	386 (20.9)	391 (19.5)	
4-year college graduate	406 (22.0)	465 (23.2)	
> 4-year college degree	909 (49.2)	987 (48.8)	
Gender			.944
Male	921 (49.5)	1011 (50.5)	
Female	874 (47.3)	955 (47.7)	
Hispanic or Latino			.900
Yes	88 (4.8)	98 (4.9)	
No	1691 (91.5)	1848 (92.3)	
Race			.142
White	1555 (84.1)	1716 (85.7)	
Black/African American	142 (7.7)	135 (6.7)	
Asian	77 (4.2)	61 (3.0)	
Native Hawaiian/Other Pacific Islander	4 (0.2)	1 (0.0)	
American Indian or Alaska Native	10 (0.5)	12 (0.6)	

Note. Numbers do not total 1849 and 2003 because of missing data.

Appendix F

Table 2

Responses of Patients Surveyed about Their Patient Portal and Health IT Experience at a Clinical Research Center (1st survey N=1849, 2nd survey N=2003)

Question	N(% Pre)	N(% Post)
1. How long have you used the patient portal?		
1 year or less	722 (39.0)	1177 (58.8)
2 years	523 (28.3)	416 (20.8)
3 years	558 (30.2)	392 (19.6)
2. In the last 12 months, did you email your provider with a medical question?		
Yes	709 (38.3)	690 (34.4)
No	1112 (60.1)	1284 (64.6)
3. In the last 12 months, when you emailed your provider, how often did you get an answer to your medical question as soon as you needed?		
Never	249 (13.5)	246 (12.3)
Sometimes	80 (4.3)	76 (3.8)
Usually	166 (9.0)	173 (8.6)
Always	642 (34.7)	629 (31.4)
4. In the last 12 months, when you emailed, how often were all the questions answered?		
Never	231 (12.5)	227 (11.3)
Sometimes	74 (4.0)	69 (3.4)
Usually	183 (9.9)	184 (9.2)
Always	643 (34.8)	643 (32.1)
5. Are your laboratory or other test results on the patient portal site for you to see?		
Yes	1258 (68.0)	1649 (82.3)
No	106 (5.7)	78 (3.9)
Don't know	426 (23.0)	222 (11.1)
6. In the last 12 months, did you look for your lab or other test results on the patient portal site?		
Yes	1249 (67.6)	1632 (81.5)
No	517 (28.0)	294 (14.7)
7. In the last 12 months, how often was it easy to find these lab or other test results on the patient portal site?		
Never	232 (12.5)	89 (4.4)
Sometimes	192 (10.4)	210 (10.5)
Usually	405 (21.9)	517 (28.5)
Always	708 (38.3)	876 (43.7)
8. In the last 12 months, how often were these lab or other test results put on the patient portal site as soon		

	as you needed them?		
	Never		
	Sometimes	228 (12.3)	95 (4.7)
	Usually	185 (10.0)	168 (8.4)
	Always	445 (24.1)	517 (25.8)
9.	In the last 12 months, how often were these lab or other test results presented in a way that was easy to understand?	658 (35.6)	883 (44.1)
	Never		
	Sometimes	222 (12.0)	120 (6.0)
	Usually	168 (9.1)	244 (12.2)
	Always	427 (23.1)	569 (28.4)
10.	In the last 12 months, did your provider offer you visit notes?	712 (38.5)	761 (38.0)
	Yes		
	No	549 (29.7)	746 (37.2)
	Don't know	613 (33.2)	725 (36.2)
11.	In the last 12 months, how did your provider offer you the visit notes?	551 (29.8)	422 (21.1)
	On paper		
	On a website	594 (32.1)	558 (27.9)
	By e-mail	263 (14.2)	470 (23.5)
	Some other way	259 (14.0)	258 (12.9)
12.	In the last 12 months, did you look at any visit notes from this provider?	212 (11.5)	127 (6.3)
	Yes		
	No	714 (38.6)	823 (41.1)
13.	In the last 12 months, how often were the visit notes easy to understand?	916 (49.5)	410 (20.5)
	Never		
	Sometimes	200 (10.8)	56 (2.8)
	Usually	94 (5.1)	79 (3.9)
	Always	328 (17.7)	338 (16.9)
		464 (25.1)	485 (24.2)

Note. Numbers do not total 1849 and 2003 because of missing data.

Appendix G

Table 3

Frequencies of Use of Patient Portal Functions Pre (N=1849) and Post Implementation (N=2003)

In the last 12 months:	Pre-Implementation N=1849		Post-Implementation N=2003		t
	Mean	SD	Mean	SD	
When you emailed your provider, how often did you get an answer to your medical question as soon as you needed?	3.06	1.23	3.05	1.23	0.97
When you emailed your provider, how often were all the questions in your email answered?	3.09	1.20	3.11	1.20	0.24
How often was it easy to find lab or other test results on the portal?	3.03	1.09	3.29	0.88	7.34*
How often were results put on the portal as soon as you needed?	3.01	1.08	3.32	0.87	8.79*
How often were results presented in a way that was easy to understand?	3.07	1.07	3.16	0.92	0.28**

Note. *p<.0005, **p=.005.

Appendix H

Table 4

Reported Ease of Use of Visit Notes Via Web Pre (N=219) and Post Implementation (N=407)

In the last 12 months:	Pre-Implementation N=219		Post-Implementation N=407		t
	Mean	SD	Mean	SD	
How often were the visit notes easy to understand?	3.45	0.685	3.51	.650	1.02

Note. These subsamples consisted of those patients who answered “yes” to accessing and looking at visit notes via the web. p=.309).