

An exploratory study of patient portal adoption and use in multiple clinical specialty departments

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Abstract

A patient portal is an effective vehicle for health information dissemination, a key component of knowledge management. The focus of this exploratory research study was to examine how demographic variables of gender and age as well as clinical specialty grouping affect patient portal adoption and use at a hospital in South Florida. We conducted a semi-structured interview focusing on portal adoption and usage with 768 patients at their scheduled appointments. Results showed that younger participants aged 20 to 30 used the portal significantly less than other age groups in the study. Patients between the ages of 41 and 60 use the portal the most. Findings suggest a need to expand patient portal functionality, portal education and awareness to increase patient portal use. These preliminary findings will support a broader effort investigating patient portal use and barriers such as eHealth literacy skills.

Keywords: Informatics, Patient Portal, Knowledge Management, eHealth, Electronic Health Records Adoption and Use.

Introduction

Background

The Health Information Technology for Economic and Clinical Health Act, 2009 (HITECH), moved the health information technology needle further by initiating electronic health (eHealth), namely electronic health records (EHRs) and patient portals. The resources came through the rules of Meaningful Use (MU) administered by the Centers for Medicaid and Medicare (Aljabril et al., 2018; Centers for Medicare and Medicaid Services, 2013). Patient portals were now mainstream. The initial enrollment into a patient portal signifies adoption, while engagement is actively using the portal (Aljabri et al., 2018). To reduce any confusion, we replaced the word “engage” to “use” in this study. Secure information access and effective information dissemination are core components of the knowledge management (KM) processes (Croasswait & Curtice, 1994). Knowledge sharing through social networks, such as patient portals, is a human strategy in KM (Choi & Lee, 2002). Choi and Lee (2012) explained that the human strategy in KM is learning from experienced and skilled people. The seamless transfer of healthcare information between provider and patient through a portal has shown to empower patients. Patient portals give secure access to the patient’s personal health information (PHI). This data and information are measurable and verifiable, and when used in the proper setting

becomes knowledge, which in turn becomes of great importance in the healthcare decision-making process. Patients can now actively participate in the decision-making process with their healthcare team by actively using the patient portal. Patients are increasingly assuming more responsibility for their healthcare; they are demanding increased value from their healthcare organization's KM processes (Cepeda-Carrion, Martelo-Landroguez, Leal-Rodriguez, & Leal-Millan, 2016). The knowledge sharing process coupled with patient demand and increased patient use of portals has forced hospitals to focus on improving their quality of medical record documentation (Pavani, 2008; Gowen et al., 2009). eHealth is the use of information and communication technologies for health (World Health Organization, 2018) and allows for a culture of knowledge sharing, ultimately increasing collaboration between patient and healthcare providers. There is a lack of KM and patient portal research creating a need to explore this unique relationship, in terms of impact on patient outcomes (Razzaque & Karolak, 2010). Patient portals link the right people, in the right context using the right technology format. Patient portals are eHealth systems and they "create opportunities to improve knowledge, self-efficacy, and engagement" (Ancker et al., 2015, p. 254).

Prior to 1996, the issues of a fragmented United States healthcare system coupled with multiple administration concerns including hand-written medical records and storage systems made medical record retrieval problematic (Furukawa et al., 2014; Rittenhouse et al., 2017). The Health Insurance and Portability and Accountability Act (HIPAA) of 1996 for the first time made it possible for patients to access their protected PHI and medical records (United States Department of Health and Human Services, 2018). PHI had become more accessible, which has put a strain on confidentiality and security. As access avenues multiplied, patients became more concerned about privacy and security. Patients are deeply concerned over who has access to their personal health record, and what level of access (Dhillon, et al., 2018). Dhillon (2018) further stated that there is a discrepancy between what patients expect in the confidentiality of their medical record and actual. Patients want control over their information (Cain & Hanania, 2013; Schwartz et al., 2015).

There are multiple stages of Meaningful Use. Meaningful Use - Stage 1 criteria stipulate capturing health data and sharing it. Stage 2 focuses on health information exchange and patient-controlled data, namely patient portals (Centers for Medicare and Medicaid Services, 2013). The Office of the National Coordinator for Health Information Technology (NCO), "What is a patient portal?" (2019), considered a patient portal to be a crucial component of eHealth and defined patient portals as, "secure online website that gives patients convenient, 24-hour access to personal health information from anywhere with an Internet connection using a secure username and password, patients can view personal health information" (ONC Patient Portal Benefits, 2019). Patient portals allow access to PHI including current and past medical history and test results. Portals open communication between patients and providers, allowing patients to request medication refills, and manage their appointments. Through a proxy, one can manage a loved one's health information in the portals to improve overall patient care, "Nearly one-in-five individuals care for or make health care decisions for someone with a medical or behavioral condition or disability" (ONC Data Brief, 2018, p. 9). Patient portals are accessible through a variety of devices including computers, laptops, or mobile devices such as tablets or smartphones. Notable challenges or barriers with utilization of patient portals are the

cumbersome registration process, health literacy, patient education, computer access and difficulty using the portal (Baldwin, Singh, Sittig, & Giardina, 2017; Mayberry, Kripalani, Rothman, & Osborn, 2011; NCO Patient Portal Benefits, 2019; Osborn, Mayberry, Wallstonka, Johnson, & Elast, 2013; Zickmund et al., 2008).

MyChart is the patient portal used at the hospital at the time of this exploratory. MyChart is a product of Epic, used with their electronic medical record software (Epic, 2019). MyChart is a free online portal allowing patients secure access to PHI and communication with their healthcare team. Some of the information a patient can access include test results, physician progress notes, preventive care information, and upcoming appointments as well as to set appointments, review current health issues, email the healthcare team all from multiple communication devices with a secure Internet service. The range of information accessed and the ability to download information varies by the portal. The hospital's portal in this study offers eVisits or telemedicine with stipulations. Loved ones may, with permission, access the portal. According to Sarkar Karter, Liu, Adler, Nguyen, and Lopez (2011) and Tenforde, Nowacki, Jain, and Hickner (2012), patients most frequently visit their patient portal to check laboratory results, check medication refills, communicate with their provider via email and to make appointments. The portal is in English, Spanish, and there is an interpreting company available for other languages. The portal is HIPAA compliant and falls under the hospital's security protocols. Once an account is set up through their healthcare provider, users will connect to the Internet, enter the account code, and create a username and password. Patient portals provide increased effectiveness in healthcare by the transfer of personal health information from the healthcare organization to the patient, allowing active engagement in the decision-making process. This improves clinical outcomes, increases provider-patient communications, quality of care, improves patient self-management, reduces costs, and increased patient satisfaction (Hoogenbosch et al., 2018; Kruse, Argueta, Lopez, & Nair, 2015; Osborn, Maryberry, Mulvaney, & Hess, 2010; Tenforde et al., 2011). Limited use or engagement of patient portals by both patient and provider may hinder meaningful clinical outcomes leading to nominal patient improvements (Miller, Latulipe, Melius, Qunadt, & Arcury, 2016; Sun et al., 2018).

The purpose of this study was to examine how demographic variables of gender and age as well as clinical specialty groupings impact on patient portal adoption and use. The hospital's use rate for the patient portal at the time of this study was 47%. According to the ONC Data Brief (2018), 48% of patients are not offered information on how to access online medical records via a patient portal. Of the 52% that are, only 28% used the patient portal at least once in the past year, and 26% of those used it three to six times in the past year (ONC Data Brief, 2018).

Methodology

Design, Setting, and Participants

The data collection part of this exploratory study occurred over a three-month period in 2017. Participants in this study were existing patients of a South Florida hospital. Patients who were at their scheduled appointment were approached by research team members, and asked if they wanted to participate in a brief focused semi-structured interview. This was strictly voluntary, and no PHI were collected. Interviews were paper based, conducted in English, and recorded by

the research team members. The interview took approximately five minutes to complete. The focused semi-structured interviews were conducted face-to-face in four locations within the hospital and two separate off-site clinics that were part of the hospital system for a total of six separate locations. Each location consisted of multiple healthcare clinical service specialties. We focused our efforts on these locations because of their heavy patient traffic volume. The first location and the off-site clinic (sixth location) both included internal medicine, but at two separate physical locations. The second location and the off-site clinic (fourth location) both included speech therapy, two separate physical locations. All six locations had a designated patient check-in desk. At the patient check-in, hospital staff confirmed appointments as well as which provider the patient was seeing for that visit that day, and then asked patients if they signed up for the portal. Through our unstructured observation, it was obvious that asking patients about the portal did not happen consistently. The first location included Internal Medicine, Infectious Disease, Endocrinology, and Endocrine Surgery. The second location included Dermatology, Speech Therapy, and Otolaryngology. The third location included Orthopedic Surgery, Hand Surgery, Pain Management, Podiatry, Rheumatology, Nephrology, and Pulmonary Medicine. The fourth location, an off-site outpatient clinic of the hospital, included Physical, Occupational, and Speech Therapy. The fifth location included Hematology and Oncology, and the sixth location, an off-site outpatient clinic of the hospital included Physical Therapy, Cardiac Rehabilitation, Pulmonary Rehabilitation, Geriatric, and Internal Medicine.

Measures

Data Collection

The main purpose of the focused semi-structured interview was to determine patient portal adoption and use. The focused semi-structured interview included questions that allowed the participants express their opinions on the patient portal as well as their usage. Prospective participants who voluntarily agreed to participate in the interview were first asked to self-declare their gender, age range, area of specialty medicine they were there to see that day and which provider. Participants were asked the following questions: How long they were a patient of the hospital. If they were signed up for the portal and accessed it? If so, how long? If not, are they interested in signing up? We asked the participants at their check-in if they signed up for the portal. The last two questions were two semi-open queries. Are there any barriers they have encountered when accessing the portal? Do they have any comments regarding the portal? After the semi-structured interview, we compiled the aggregate data. No PHI data such as patient name, medical record number, home residency addresses, phone number, or any other identifying information were collected.

During the one-on-one semi-structured interview process, we acknowledge that many patients were interested in obtaining more information about the patient portal. We were able to assist many of the patients who were interested in signing-up for the portal. We provided these participants with an overview of the patient portal and gave them brochures (English or Spanish as well as a language translation service contact if needed) detailing more information. Those that were not signed-up but expressed an interest also received a brochure, as well as an

explanation of the portal and the sign-up process. For those interested in signing up for the patient portal, we guided them through the sign-up process, which was as follows: Once the patients received an activation code from the front desk staff, we worked with the patient one-on-one to complete the online registration form using a borrowed hospital laptop. This entailed patients entering into the portal system sensitive patient information as well as patient identifiable information including creating a personalized user name and password.

While conducting the focused semi-structured interviews, we had several opportunities to observe the front desk staff's workflow with each of the departments regarding the patient sign-in process. Our only interest in front desk workflow was to see if staff approached patients regarding the patient portal, and if so, what was the enrollment process for those not signed up. Patients that were not signed up but expressed interested triggered the front desk staff to first, log into the system and generate a code necessary for the patient to enroll. Next, they gave minimal instructions and the educational pamphlet on the portal. As stated previously, asking about the portal was not consistent across departments and process seemed more sporadic than routine. This was not a priority of the front desk. There was a kiosk in the hospital on the first floor next to internal medicine with a designated computer and MyChart sign. However, most times it was offline, the sign was not inviting, and the pamphlets at the kiosk ran out the first few days we were there observing. It seemed like the hospital staff did not replenish it.

Results

Findings and Data Analysis

Table 1 displays the characteristics of gender and age group of patient portal users and nonusers. The only conditions to be included in the study were, patients had to be at least 20 years old, have an appointment in one of the six hospital locations and voluntarily give consent. We felt that this would capture the general population of those seeking services at the hospital. We interviewed 768 participants for this exploratory research study, of which 43.8% (337 of 768) were male and 56.1% (431 of 768) were females. Higher rates of patient portal use are associated with younger, female and those that are well educated (Ancker et al., 2015; Haun, Patel, Lind, & Antinori, 2015; Irizarry, DeVito, & Curran, 2015). Of all participants usage of the patient portal for males was 25.0% (192 of 768), and for females was 32.9% (253 of 768). Overall all males who participated had a portal usage of 56.9% (192 of 337), while all females who participated had patient portal usage of 58.7% (253 of 431). Overall all male participants who were nonusers of the patient portal were 43.0% (145 of 337), and of all female participants who were nonusers that number was 41.2% (178 of 431).

Age group was broken out into seven categories. We felt it was necessary to look at several groups to be able to tease out generational patient portal utilization (Aljabril et al. 2018; Oest, Hightower, & Krasowski, 2018). Age categories were as follows: 20-30 (28), 31-40 (104), 41-50 (193), 51-60 (211), 61-70 (153), 71-80 (31), and 80+ (48). Participant portal usage by age group shows that the majority 57.5% (256 of 445) of those who use the portal were between the ages of 41 to 60, year olds (41 to 50 & 51 to 60 age groupings). Of all participants in the study, 57.9% (445 of 768) stated they are using the patient portal. This is 10.9% above what the hospital reported.

Table 1. Characteristics of Portal Users and Nonusers – Gender and Age (N=768)

Characteristics	User (n= 445)		Nonuser (n= 323)		Total (N=768)
	No.	%	No.	%	No.
Gender					
Male	192	43.2%	145	44.8%	337
Female	253	56.8%	178	55.2%	431
Total	445	100%	323	100%	768
Age Group					
20-30	4	00.9%	24	07.4%	28
31-40	58	13.0%	46	14.2%	104
41-50	117	26.2%	76	23.5%	193
51-60	139	31.2%	72	22.2%	211
61-70	86	19.3%	67	21.0%	153
71-80	18	04.2%	13	04.0%	31
80+	23	05.2%	25	07.7%	48
Total	445	100%	323	100%	768

Table 2 displays medical specialty department grouping location of patients that are using the portal and those that are not. Location 3 had the highest percentage of users 32.1%, followed by Location 1 with 19.8%, and Location 2 at 17.5%. Overall 58% (445 of 768) of the respondents used the portal.

Table 2. Characteristics of Portal Users and Nonuser – Hospital Department Areas (N=768)

Department	Engaged (n=445)		Not Engaged (n=323)		Total (n=768)	Asked to Sign-in at the Front Desk		
	No.	%	No.	%	No.	No	Yes	Total
<i>Location 1:</i> Internal Medicine, Infectious Disease, and Endocrinology and Endocrine Surgery	88	19.8%	57	17.6%	145	76	69	145
<i>Location 2:</i> Dermatology, Speech Therapy, and Otolaryngology	78	17.5%	57	17.6%	135	62	73	135
<i>Location 3:</i> Orthopedic Surgery, Hand Surgery, Pain Management, Podiatry, Rheumatology, Nephrology, and Pulmonary Medicine	143	32.1%	115	35.7%	258	177	81	258
<i>*Location 4:</i> Physical, Occupational, and Speech Therapy	21	4.7%	14	4.3%	35	23	12	35
<i>Location 5:</i> Hematology and Oncology	64	14.4%	40	12.4%	104	62	42	104
<i>*Location 6:</i> Physical Therapy, Cardiac Rehabilitation, Pulmonary Rehabilitation, Geriatric and Internal Medicine	51	11.5%	40	12.4%	91	67	24	91
Total	445	100%	323	100%	768	467	301	768

* Off-site clinics

Table 3 captures data on participant portal usage over time listed in years. Patient portal usage in the 1 to the 3-year range was 41.5% (185 of 445). Patient portal use for the 4 to 5 year range was

14.1% (63 of 445). That number nearly doubles to 27.1% (121 of 445) for those using the portal for the 6 plus year range. Those using the patient portal for less than 1 year were 17.1% (76 of 445).

Using a chi-square (χ^2) test of independence, we found that the 20-31-year-old age group used the patient portal significantly less (14%) than all the other ages $\chi^2(6, N=768) = 30.28, p<0.001$. This is consistent with similar finding (Wallace et al., 2016). No difference was found between males and females ($p = 0.738$) or department ($p = 0.867$) in terms of portal usage.

Table 4 displays the breakout on how participants found out about the patient portal. The front desk carried the bulk of the responsibility with approximately 39.2% (301 of 768) of the participants stating that the front desk approached them regarding the patient portal. Followed by the physician and nurse at 20.0% (154 of 768), and the practicum students at 18% (137 of 768). The front desk, physician and nurse accounted for nearly two thirds or 59.2% (455 of 768).

Table 3. Patient Portal Usage by Department by Years (N=445)

Department/Provider	Number of Years Using the Patient Portal				
	< 1 Year	1-3 Years	4-5 Years	6+ Years	Total
<i>Location 1:</i> Internal Medicine, Infectious disease, Endocrinology, Endocrine Surgery	11	40	12	25	88
<i>Location 2:</i> Dermatology/Speech Therapy, Otolaryngology	15	37	4	22	78
<i>Location 3:</i> Orthopedic Surgery, Hand Surgery, Pain Management, Podiatry, Rheumatology, Nephrology & Pulmonary Medicine	21	59	27	36	143
* <i>Location 4:</i> Physical, Occupational and Speech Therapy	2	7	2	10	21
<i>Location 5:</i> Hematology/Oncology	15	29	9	11	64
* <i>Location 6:</i> Physical Therapy, Cardiac Rehabilitation, Pulmonary Rehabilitation, Geriatric and Internal Medicine	12	13	9	17	51
Total	76	185	63	121	445

* Off-site clinics

The results of adoption and use of the patient portal allowed us to place participants into one of four groupings. The first group included patients who knew about the portal and were active users. In the second group were patients who knew about the portal and signed up but were not users of the portal. In the third group were patients who knew about the portal yet had not signed up, and in the fourth group were patients who did not know about the portal. We discovered that most of the participants were in either in the first or the third group. The focused semi-structured interview had two questions, which gave participants an opportunity to express themselves. The first question: Are there any barriers for you to accessing the patient portal? The second question: Do you have any comments regarding the patient portal? Participants in the third group listed the following barriers or reasons for non-portal engagement: limited technical ability and

computer literacy skills; time-consuming; primary care services received in other healthcare organization; inadequate access to computers and the Internet; and reluctance. Participants in the second group listed the following barriers: forgot password and or username and not easy to use. Common barriers to patient portal adoption and use are difficulties accessing the portal due to username and password issues, and the complications of navigating the portal (Powell & Myers, 2018).

Table 4. How patients learned about the portal (N=768)

How Patient learned about the Portal		
	No.	%
Physician/Nurse	154	20.0%
Email	63	8.2%
Front Desk	301	39.2%
Other: Facility/Friend	21	2.7%
Pamphlet	44	5.7%
Paperwork	48	6.2%
Practicum Student	137	18.0%
Total	768	100%

Of all the patient portal users in the study, most self-declared that they were satisfied, and some non-users were willing to consider the utilization of the portal after participating in the study. Aljabril et al. (2018) found that there was no strong evidence between the satisfaction of patient portal use and actual utilization (Goldweig et al., 2013; Kruse et al., 2015; Neuner et al. 2015; Woollen et al., 2016).

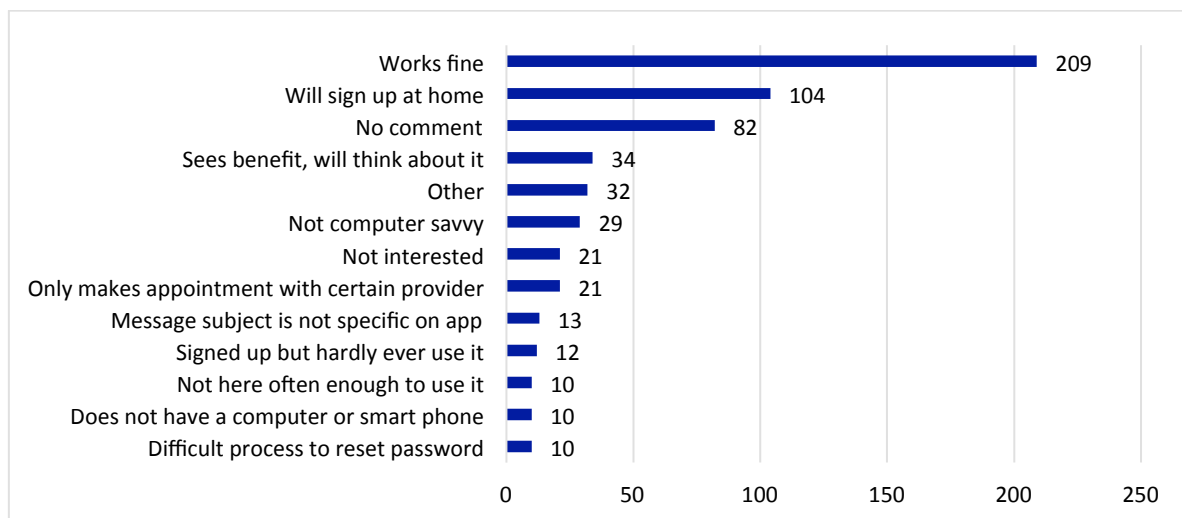


Figure 1. Participant Comments Collected (N=587)

Figure 1 is a frequency breakout of participant comments. Not all participants gave a comment and some gave multiple comments. Comments were grouped together that were analogous by the research staff. For example, the patient comment “not computer savvy” was a compilation of, my son will sign me up because he is computer literate, someone with a computer who understands will sign me up, I do not understand computers, and I am not computer savvy at all. The grouped comments allowed the researchers to understand the participant feelings and thoughts regarding the patient portal. Several responses of interest in Figure 1 include the following. Of the overall comments by respondents, 36% (209 of 587) said the portal works fine and they were satisfied, while 18% (104 of 587) stated they will sign up at home, and 14% (82 of 587) of the participants had no comment.

Discussion

There are numerous methods to capture patient portal engagement and use rates. Patient portal log-ins capture report usage, although this method is void of functionality and context (Irizarry et al., 2015). Another method is to look at active (interaction with the portal) and passive (just logging in) (Perry et al., 2014). This exploratory study captured data that was self-reported. This initial data will eventually be foundational to a more comprehensive study of patient portal adoption and use at the hospital. The following is a discussion of information gathered from the semi-structured interview, observations, and comments.

Usability and Functionality

A basic understanding of usability refers to the interface of the system and its ease of navigation, interactivity, learnability, and content relevance (Lee & Kozar, 2018). User friendliness including navigation of patient portals, which continues to be an issue with both patients and providers (Kruse et al., 2015). Although usability and functionality have some similarities yet differ, we discuss both as a single topic area as this was not the focus of the research. The clinical staff as well as participants, demonstrated frustration with the portal’s usability and functionality. Comments stating frustration with usability and functionality included it was a difficult process to log in setting up a password, and username. Streamlining the log in process would go a long way to strengthen patient adoption and use of the portal. Other comments regarding the portal as being too busy. Partitioning the portal will increase ease of use. Consumer-focused technologies can be improved by making them patient-centered ensuring they foster robust communications enabling knowledge flow to patients and providers (Ancker et al., 2015). Patients that are actively using a portal regarding their health have better health related outcomes (Green & Hibbard, 2011; Hibbard et al., 2010; Remmers, Hibbard, & Mosen, 2009).

Clinical

More detail on the patient notes in the electronic medical record could be available. Messaging was available but there were problems. If a patient sent a message, then the physician responded to the message. However, if the patient wanted again to reply to the same message with the physician’s response, then the patient could not reply to the message. The patient needed to create an entire new message and re-state the whole conversation with the new information from the physician. The patient had limited ability to make appointments with their general physician.

At the time of the study, patients could not make appointments with specialists. Keeping data up to date in sync with the electronic medical record was also an area of concern. Accessible up-to-date data is crucial for a complete and accurate medical history (Miller et al., 2016). The staff has stated that the electronic medical record does not indicate to them that the patient is a user of the portal. On many occasions when the patient is at the end of their appointment, the system prints out an authorization code for the portal, and that is how staff discover that the patient is not a user of the portal. Staff have stated that they need to be deep into the system before it becomes evident to them that a patient is not a portal user. Disruption of workflow infringing on time constraints are challenges limiting healthcare providers use of portals, thereby potentially decreasing accurate up-to-date information potentially minimizing or negatively affecting patient health outcomes (Miller et al., 2016).

Administrative

Many participants were not aware of the portal and its benefits. Ratliff-Schaub and Valleru (2017) suggested increasing awareness of patient portals including training clinical staff on registering patients is necessary to engage patients in portal use, which increases patient and provider communication creating better health outcomes. The hospital currently has pamphlets in multiple languages, which include included English, Spanish, and Haitian Creole (French based). Signage and pamphlets are a good strategy when generously available throughout the clinic settings, and will educate and increase awareness of the portal. This information can also be available on hospital websites and downloadable. Television monitors can also broadcast this information throughout the hospital where appropriate.

Conclusion

Limitations

There are limitations in this exploratory research study. Patient portal utilization is a quality metric for Meaningful Use. Several different methodologies used to measure patient portal adoption and use include patient logins and active interaction. This explorative study focused on adoption and use of the patient portal. It does not address all aspects of patient portal usage such as educational level, health literacy, income level, marital status and other demographic variables. A more inclusive study would include more demographic information, health literacy, and perhaps a look at how users come to the awareness and resistance to such technology using a survey-based instrument. We collected no PHI, nor did we have access to any electronic medical records. Participants of the study self-reported the data and information. We choose large departments within the hospital because we felt that we would get a good response. Ideally, some small departments could participate in giving a more inclusive sampling of the hospital. The focused semi-structured interview was not a validated instrument. We are anticipating that the findings will garner enough interest at the hospital allowing further exploration of the patient portal adoption and use rates for a more sophisticated study and analysis.

This exploratory research study conducted a one-on-one focused semi-structured interview collecting self-reported patient portal adoption and use data from 768 voluntary participants. Findings of interest included younger participants in the age group of 20 to 30 utilized the patient

portal significantly less than all other age groups, and that there was no real difference between patient portal use based on gender. About 57.9% (445 of 768) of all study participants were using the hospital's patient portal. The majority 57.5% (256 of 445) of those who using the portal are between the ages of 41 to 60 (41 to 50 and 51 to 60 age groupings). This is 10.9% above what the hospital reported, though this is a sample. Most users were between the ages of 41 to 60. Participants from location three had the highest utilization rates for the portal 32.1% (143 of 445). As we get older, we tend to take on health issues and often multiple health issues or comorbidities (two or more chronic diseases). These findings suggest that those in the age category of 41 to 60 may be facing more serious medical issues or dealing with multiple health issues and are more inclined to use their patient portal (Aljabril et. al. 2018; Hoogenbosch et. al., 2018; Oest et. al., 2018).

Future Research

The next step is to conduct a more comprehensive investigation of patient portal adoption awareness and resistance to use at the hospital. The issues identified from this semi-structured interview (functionality, education, & awareness) require closer examination. Comments by participants on the comfort level with the patient portal demonstrates there is a need to measure health literacy and eHealth literacy. Measuring patient awareness, knowledge, and skills on how to use information technology and health literacy can help to determine patient comfort levels with eHealth (Norman & Skinner, 2006). Utilizing a health literacy scale will identify health literacy needs, measuring them and developing a method to address those needs, and measuring the result of the intervention (Ownby, 2015). Addressing health literacy along with a more comprehensive analysis of demographic information, underserved ethnic and racial populations, and health issues will provide a more meaningful understanding of patient portal adoption and use (Coughlin, Stewart, Young, Heboyan, & De Leo, 2018). There are opportunities to increase patient portal use through awareness education of both provider and patient and addressing health literacy (Coughlin et al., 2018; Tieu et. al., 2017).

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