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Patient Portal Use and Patient Education Materials Access among Mississippi Adult Residents

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PATIENT PORTAL USE AND PATIENT EDUCATION MATERIALS ACCESS AMONG MISSISSIPPI ADULT RESIDENTS

by

Anna Swann

A Dissertation
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ABSTRACT

Patient education plays a vital role in improving the health outcomes of patients with chronic diseases and helps prevent illness in otherwise healthy individuals. Patient portals allow patients to access their EHRs, communicate with their healthcare providers, and access patient education materials. Despite the potential for patient portals and education materials to improve health outcomes, many barriers prevent patients from utilizing them. Uneducated patients are more likely to participate in risky health behaviors, which leads to poor health outcomes. Poor health outcomes lead to higher medical costs. Mississippi has a high rate of chronic diseases. Suppose the barriers to patient portal use and educational material use are understood. In that case, patient portal use and patient educational material use could be promoted, and the health of MS could be improved.

Quantitative research methods, including descriptive statistics, survey data, and correlational statistics, were used to address the research questions for this study. A questionnaire was used to gather data on portal use, accessed portal features, and participant demographics. Frequency distributions were used to determine the percentage of portal users versus portal non-users, the percentage of portal users accessing the patient educational materials, the most common barriers to portal use, the most useful portal features, and to describe users vs. non-users. A binary logistic regression was performed using the demographics (IV) as the predictor of portal use and non-use (DV).

Most adult residents in MS use patient portals; however, very few access the patient educational materials in their portal. The main barrier to portal use in MS is a lack of need. Adults in MS also prefer to speak to their healthcare providers in person. Patient portal users in MS are non-Hispanic, white, of high-socioeconomic standing, ages 25-44 years, and have a bachelor's degree or higher. The sample used for this study was a convenience sample, was not diverse, and may not accurately depict portal use, educational material use, perceptions of patient portals, or barriers to portal use in the population of MS. Studies with more diverse samples need to be performed.

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The road to earning my Ph.D. has been long, and it is not a journey I could not have completed without the help of my dissertation committee, family, friends, and coworkers. Without the support of these individuals, I do not know if I could have made it. Thank you to everyone.

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A special thank you to Denise Williams at the Research Support Center. Denise went above and beyond the job required to help me complete my logistic regression. I would still be working on it if Denise had not been so willing to help. Thank you to my coworkers in Medical Laboratory Science. They were always ready to help lighten my load, hear me whine when things got tough, and allow me to bounce ideas around. A very special thank you goes to my family. Words cannot express how much your support meant to me. Finally, thank you to everyone who took the time to complete my questionnaire and pass it on.

DEDICATION

This dissertation is dedicated to my late father, Dr. Mark Stevens. I wish you were here to see me complete my Ph.D. Unfortunately, you were diagnosed with ALS shortly after I began graduate school. My dissertation topic was inspired by the stories you would share of patients in poor health because they did not have the knowledge needed to make healthy lifestyle choices. They lacked the education to improve their health outcomes, specifically health education. Thank you for sharing stories of your healthcare journey. Those stories motivated me to become a better healthcare educator.

I would also like to dedicate this dissertation to my family. Saying thank you was not enough for all the support you have given me. Thank you to my mom for constantly pushing me to do my best. Thank you to my husband, Grady Swann, for taking care of the kids when I had night statistics classes. Thank you for taking care of fights and feeding them when I was locked in my room or sitting outside doing homework. Thank you to my kids, Gray and Sadie, for not giving me a hard time when schoolwork took precedence. You can finally call me Dr. Mom! I love you and your dad more than words can say.

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LIST OF ABBREVIATIONS

ARRA	American Reinvestment and Recovery Act
CMS	Centers for Medicare and Medicaid
CHF	Congestive Heart Failure
CI	Confidence Interval
EHR	Electronic Health Record
EMR	Electronic Medical Record
HINTS	Health Information National Trends Survey
HIT	Health Information Technology
HITECH	Health Information Technology for Economic and Clinic Health
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
MU	Meaningful Use
MI	Myocardial Infarction
MS	Mississippi
NCI	National Cancer Institute
NVS	Newest Vital Sign
ONC	Office of the National Coordinator for Health IT
OPE	Online Patient Education
PHI	Personal Health Information

TAM	Technology Acceptance Model
USM	The University of Southern Mississippi

CHAPTER I - INTRODUCTION

Education is the process of teaching or learning new information (*Education*, n.d.). Patient education is the process of teaching patients further information so they may understand the skills needed to maintain or improve their health ("Patient Education," 2000). Patient education significantly improves health outcomes in those with chronic diseases and prevents illness and chronic diseases in otherwise healthy people. Patients educated about their disease or illness and instructed on preventing complications associated with poor management of those diseases can self-manage their healthcare through informed decisions, improving their health outcomes and quality of life (Atack & Luke, 2012).

One in three adults in the United States uses the internet to research their health problem or the health problem of someone they know (Volk & Obeid, 2019). However, access to unlimited information that may not be accurate can overwhelm the individual (Atack & Luke, 2012). To prevent patient anxiety and possible medical errors, the healthcare provider must direct patients to the appropriate education materials (Volk & Obeid, 2019). Win et al., (2016) identified the two most essential design features of online patient education (OPE). OPE should include information tailored to the patient's needs. The information should also be presented in an interactive format (Win et al., 2016). Patients with information specific to their needs are more likely to learn and benefit from the information (Atack & Luke, 2012). The primary benefit of OPE use is improving patient health outcomes (Win et al., 2016).

One method to engage patients in their healthcare and improve their health outcomes is promoting health information technology use by physicians and patients

(Clark, Costello, Gebremariam, Dombrowski, 2015). Health information technology (HIT) is a digital technology specifically designed for patient care (Gordon & Hornbrook, 2016). In an effort to modernize the infrastructure of the United States, the American Reinvestment and Recovery Act (ARRA) was enacted on February 17, 2009 (*Introduction | Meaningful Use | CDC*, 2017). Part of ARRA is the Health Information Technology for Economic and Clinic Health (HITECH) Act. In an effort led by the Centers for Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health IT (ONC), the HITECH Act promotes the meaningful use of HIT ("Introduction | Meaningful Use | CDC," 2017).

Due to the HITECH Act "Meaningful Use" financial incentive program, there has been a surge in the use of HIT, such as electronic health records (EHRs) to document patient health information (Tieu et al., 2015). An EHR is a digital record of a patient's medical and treatment history; a digital record of the patient's healthcare (*What Is an Electronic Health Record (EHR)? | HealthIT.Gov*, n.d.). Part of an EHR includes patient access to their health information through a patient portal. Patient portals are secure web-based servers that provide patients access to their EHRs, allow them to communicate with their healthcare providers, and enable patients to be engaged in their healthcare and improve their health outcomes (Rodriguez, Elizabeth S., 2018).

The Meaningful Use Incentive program, which has been implemented in three stages, is part of the healthcare reform found in the HITECH Act of 2009. The program requires healthcare facilities to use HIT to increase patient engagement with their healthcare outside the clinical setting (Gordon & Hornbrook, 2016; Griffin, Skinner, Thornhill, & Weinberger, 2016; Lyles & Sarkar, 2015). Stages one and two focused on promoting provider EHR adoption and patient electronic access to their health information (*Introduction | Meaningful Use | CDC*, 2017). Stage three focused on the interoperability of electronic health records and patient portals (Griffin et al., 2016; *Introduction | Meaningful Use | CDC*, 2017). The information in an EHR is entered and accessed by the patient's healthcare providers, and the patient portal is set up and used by the patient to access their personal health information (PHI) (*Moving Forward towards an Interoperable Learning Health System: Improving Flexibility, Simplicity, Interoperability and Outcomes to Achieve a Better, Smarter and Healthier System*, 2015).

Patient portals provide patients access to their PHI. They allow patients or caregivers to interact electronically with their healthcare provider by requesting appointments, requesting medication refills, communicating with their provider through a messaging system, and viewing patient education materials (Clark et al., 2015). Despite all the features available, the two most commonly used patient portal features include the messaging system and lab results section (Neuner et al., 2015; Perzynski et al., 2017). Patient-centered care increases by integrating patient portals into primary care and utilizing the patient portal's wellness and preventive medicine features. Portal use also enhances the delivery of age and risk-associated preventive medical practices; therefore, promoting portal use helps improve patient outcomes (Nagykaldi et al., 2012). However, despite the positive effect of patient portal use on patient care, patients and providers may not be willing to utilize it or see its benefits (Alpert et al., 2016; Powell & Myers, 2018).

When asked about the importance of personal health records and patient portals, all races and ethnicities consider personal health information essential to their medical care (Peacock et al., 2017). Patients of low socioeconomic standing and poorly educated patients believe patient portal use is critical for self-engagement in their healthcare. Self-engagement in healthcare is essential for improving health outcomes (Gerard et al., 2018; Nambisan, 2017).

Even though patients are aware of the benefits of portal use, they may encounter barriers that prevent them from using patient portals. Minorities, the elderly, and patients with limited health literacy face the most barriers to portal use. African Americans are twice as likely to report an unsuccessful attempt at portal use due to lack of information, motivation, a negative attitude, and connectivity problems (Goel et al., 2011). White, well-educated patients are more likely to be informed of patient portals than poorly educated African Americans and non-white Hispanics (Peacock et al., 2017). African Americans and Latinos were also concerned about portal use, making healthcare less personalized by reducing face-to-face time with healthcare providers (Lyles et al., 2016). When age is examined in concordance with ethnicity, white and Chinese patients ages 65-69 years were more likely to register for patient portals than other races and ethnicities (Gordon & Hornbrook, 2016). Patients of low socioeconomic status also perceived computer literacy as a barrier to portal use (Luque et al., 2013). African American patients, elderly patients, patients of low socioeconomic standing, and patients with low health literacy levels had security concerns about using patient portals (Goel et al., 2011; Irizarry et al., 2017; Luque et al., 2013; Tieu et al., 2015). Poorly educated patients with limited health literacy were less likely than highly educated patients with high health literacy levels to register for and use a patient portal (Sarkar et al., 2010; Smith et al., 2015; Turner et al., 2015). Patient portal use barriers are barriers to patient education materials within the patient portals (Tieu et al., 2015).

Problem Statement

The literature reveals that patient portals are perceived as useful by both patients and providers. Perceived usefulness of patient portals does not vary among races or ethnicities (Peacock et al., 2017). Furthermore, the perceived usefulness of portals does not vary among socioeconomic status or education level (Gerard et al., 2018; Nambisan, 2017). The difference among each demographic lies in the barriers to portal use each group encounters. Minorities, those of low socioeconomic standing, the elderly, and those with limited health literacy encounter the most obstacles to patient portal use (Goel et al., 2011). African Americans and non-white Hispanics are least likely to be informed of patient portals (Peacock et al., 2017). They also had concerns about patient portal security; they were worried computer hackers would access their personal health information (Lyles et al., 2016). The primary barrier to portal use for patients of low socioeconomic standing was cost; they cannot afford a home computer or internet access (Luque et al., 2013). Elderly patients stated the cost of internet access, aversion to computers, and security concerns as barriers to portal use (Turner et al., 2015). Patients with limited health literacy are less likely than those with adequate health literacy to access their patient portal (Sarkar et al., 2010; Smith et al., 2015).

Despite the potential for patient portals and patient education materials to improve health outcomes, patients face barriers that prevent patients from using them. Only a small group of patients utilize patient portals (Tieu et al., 2015). Uneducated patients are more likely to participate in risky health behaviors, which leads to poor health outcomes. Poor health outcomes lead to higher medical costs for the patient (*National Action Plan to Improve Health Literacy: Summary*, 2010), which is of concern in Mississippi (MS), primarily because of the state's high rate of chronic diseases (V. Short, 2014). Patient portal and patient education help improve health outcomes. However, there is a lack of research on patient portals and the barriers to portal use that patients in MS encounter. There is also a lack of research on the use of the patient education materials located in patient portals.

Purpose of the Study

This study aimed to investigate patient portal use among adult patients in Mississippi and determine if they have access to patient education materials within their patient portals. If so, were the educational materials being utilized. This study also investigated barriers to patient portal use that adult patients in Mississippi may encounter. This study specifically addressed the following research questions:

RQ1. Do adults in Mississippi have access to patient portals? If so, are the patient portals being utilized?

RQ2. Do adults in Mississippi utilize patient education materials located within patient portals?

RQ3. What barriers to patient portal use do adults in Mississippi face?

RQ4. What are the perceptions of patient portal use among adults in Mississippi?

RQ5. What are the characteristics of users versus non-users of patient portals?

Justification

Patient engagement began with encouraging patients to keep paper records of their healthcare and has progressed to creating electronic health records. Meaningful Use includes an incentive program for healthcare facilities that implement EHR use and has led patient engagement toward using patient portals (Kumar & L Cooper, 2015).

Meaningful Use was designed to promote the following five health outcomes: 1) improving the quality of healthcare and reducing health disparities 2) engaging patients and their families in their healthcare 3) improving coordination of care 4) improving population and public health 5) ensuring the privacy and security of personal health information (*Introduction | Meaningful Use | CDC*, 2017). EHRs and patient portals help to make the Meaningful Use health outcomes achievable by allowing all members of the healthcare team, as well as the patient, to have access to past health information and the most recent health information; thereby allowing for coordinated patient-centered healthcare (Garrett & Seidman, 2011). With the providers and patients having access to the individuals' health information, there is a reduction in medical errors, a better quality of care, and the information shared with the healthcare provider is more reliable (Laugesen & Hassanein, 2017).

Access to a comprehensive personal health history with health reminders helps improve patient self-management (Laugesen & Hassanein, 2017). An essential aspect of that health management is the availability of patient education materials. Patient portals engage individuals in their healthcare by encouraging patient and provider communication, providing access to educational material tailored to each patient, and self-management tools (Griffin et al., 2016). Patients with access to educational materials specific to their needs find the information more engaging, relevant, and easier to recall. They are more likely to learn the skills needed to manage their healthcare. Patients who use the personalized education materials are more likely to participate in good health-related behaviors (Atack & Luke, 2012). A health-related behavior is an action that can either harm or hurt the health of the person exhibiting the behavior (S. E.

Short & Mollborn, 2015). Patient portal use and patient education material use improve health outcomes by promoting a change in patient health-related behavior, eliminating the risk factors for developing a chronic disease (Win et al., 2016).

It is crucial to change patient health-related behaviors because participation in risky health-related behaviors such as smoking or excessive drinking leads to poor health outcomes (the development of chronic disease). The development of a chronic disease leads to higher medical costs for the patient and the healthcare community in Mississippi (*National Action Plan to Improve Health Literacy: Summary*, 2010). In Mississippi, chronic diseases are the most common health problem. In 2011, seven of the leading causes of death in Mississippi were related to chronic diseases (V. Short, 2014). In the United States, seven out of ten deaths each year are related to chronic diseases. The mortality rates due to chronic diseases in Mississippi are considerably higher than the national average (Gamble et al., 2012). The cost of healthcare in Mississippi related to chronic disease was expected to increase by 70% in 2020 (V. Short, 2014). If healthcare providers in Mississippi follow Meaningful Use and include the patient education materials within patient portals, and if patients access the provided education materials within their patient portals, they have the information needed to modify their health-related behaviors. If the barriers Mississippi residents face to using patient portals can be understood, patient portals and patient education materials can be promoted. Patient portals were designed to help patients better manage their health, improve health outcomes, healthcare communications, and reduce costs (Portz et al., 2019). Hopefully, the use of portals will increase, and Mississippi residents' health will improve. If the health of people living in Mississippi is improved, the cost of healthcare incurred on residents and the state may be reduced.

Delimitations

Mississippi has one of the highest rates of chronic diseases in the nation. There is a lack of literature discussing patient portal use and patient education material access in the state; therefore, this study was limited to Mississippi. The area of Mississippi is 47,715 square miles, most of which is rural (*Rural Health - Mississippi State Department of Health*, n.d.). Rule 1.31 of the Mississippi State Rural Health Plan states that an area must meet one of three descriptions to be considered rural. First, a Mississippi county is deemed to be rural if it has a population of fewer than 50,000 people. Second, it is considered rural if the area has less than 500 people per square mile. Third, a municipality of fewer than 15,000 people is considered a rural area (*Rural Health - Mississippi State Department of Health*, n.d.). The United States Census Bureau does not define rural; however, it does define two types of urban areas. An urbanized area consists of greater than or equal to 50,000 people, and an urban cluster consists of 2,500 to less than 50,000 people. Any population, housing, and territory not included in one of these areas is considered rural (*Defining Rural Population*, 2017). According to these definitions, Mississippi has a large rural population. Findings from this study may provide insight for other states with a large rural population; however, results will not be generalizable to all states, especially those with primarily urban areas.

The survey for this study was distributed using social media and the University of Southern Mississippi (USM) listserv. Using an electronic survey limited the study sample to Mississippi residents who have internet or cellular network access. Using an electronic survey also limited the study sample to Mississippi residents who are comfortable with technology. The survey was also distributed to the researcher's church and gym members. This, along with using the researcher's professional contacts, social media, account, and place of employment, could lend itself to homophily. The respondents to the survey may all be from the same demographic as the researcher.

The study was also limited to one type of health information technology (HIT), patient portals. Patient portals are an integral component of Meaningful Use; however, they are not the only HIT necessary to implement Meaningful Use. Providers must use electronic health records (EHRs) and set up patient portals for their patients to use. Only examining patient portal use limited the study to the patient perspective, not the healthcare provider perspective. Patients and providers must be willing to use HIT for its implementation and use to succeed. Those utilizing the findings of this study should proceed with caution and ensure their target population shares similar characteristics.

Assumptions

Social media and the USM listserv reach people that live outside the state of Mississippi. The researcher assumed that all survey respondents resided in Mississippi. The researcher also assumed that all survey respondents were who they claimed to be. The survey population was limited to residents of Mississippi who were eighteen years of age and older. The researcher had no method to determine who was completing the survey.

Furthermore, it may be assumed that the respondents did not receive help in answering the questions. The researcher also assumed that all respondents provided accurate and honest answers and received no prompting in creating their answers. In addition, the researcher assumed that the respondents took adequate time to answer the survey questions completely and thoroughly. The researcher also assumed respondents had access to patient portals; however, not all medical facilities have adopted health information technology such as patient portals. Finally, the researcher assumed that the sample size would be large enough to determine statistically significant differences, and the results may be generalized to the sample population.

Definition of Terms

American Reinvestment and Recovery Act (ARRA). ARRA is a stimulus package signed into law by President Barack Obama in February 2009. ARRA was designed to provide federal tax relief, expansion of unemployment benefits, and many other social welfare provisions. Funding was also provided for domestic spending in education, health care, and infrastructure ("American Recovery and Reinvestment Act—ARRA," n.d.).

Centers for Medicare and Medicaid Services (CMS). CMS is a United States Federal Agency part of the Department of Health and Human Services. CMS oversees Medicare, Medicaid, and the Children's Health Insurance Program ("History," 2019).

CMS Meaningful Use Incentive Program. Part of the HITECH Act of 2009 requires healthcare facilities to use health information technology to increase patient engagement with healthcare providers outside the clinical setting (Gordon & Hornbrook, 2016).

Electronic Health Record (EHR). A digital health record containing a patient's medical and treatment history, which can easily be shared with providers from other healthcare organizations; the patient's medical history from multiple providers (*What Is an Electronic Health Record (EHR)? | HealthIT.Gov*, n.d.).

Electronic Medical Record (EMR). A patient's digital medical and treatment history from one specific healthcare center or provider (Garrett & Seidman, 2011). For this study, it is referred to an online medical record in the survey.

Health-Related Behavior. Any action an individual exhibits that positively or negatively affects their health or mortality. They may also be referred to as health behavior. They include smoking, substance abuse, diet, amount of physical activity, amount of sleep, participation in risky sexual behavior, etc. (S. E. Short & Mollborn, 2015).

Health Information Technology. Digital technology designed for patient care, management, and communication (Gordon & Hornbrook, 2016).

Health Information Technology for Economic and Clinical Health (HITECH) Act. The section of ARRA which promotes the adoption and meaningful use of health information technology (Rights (OCR), 2009).

Health Literacy. The ability of individuals to utilize basic health information and health services to make informed and appropriate health ("Health Literacy Measurement Tools (Revised)," n.d.).

Patient Education. The utilization of health information and instruction to influence patient behavior to produce a change in their knowledge, attitude, and skills necessary to maintain or improve their health ("Patient Education," 2000).

Patient Health Information. Also known as protected health information. It includes all demographic data, patient medical histories, tests, and laboratory results.

PHI also includes any other data that the patient's healthcare provider collects to identify the patient and determine their healthcare plan (*What Is PHI (Protected/Personal Health Information)?* n.d.).

Patient Portals. Secure websites through which patients can access select information in their electronic health records. The information available includes medications, discharge summaries, immunization records, and allergies. Patients may also use the portals to message clinical staff, schedule appointments, refill prescriptions, and manage bills. Patient-specific education materials may also be accessed ("What is a patient portal? | HealthIT.gov," n.d.).

Personal Health Record. An electronic application provides a private, secure, and confidential environment for patients to access their health information (*What Is a Personal Health Record? | HealthIT.Gov*, n.d.).

Summary

With the advent of the HITECH Act came the meaningful use of electronic health records. Now patients have access to their medical records, education materials, and the ability to communicate with their providers. Patients can be actively involved in their health care anytime and anywhere. However, are patients willing to use the features, such as education materials, provided in a patient portal? If they are willing, do they have the ability to use them? Studies answering these questions have been performed in several regions of the United States but are lacking in Mississippi. This study sought to answer these questions regarding Mississippi's adult patient population.

The next chapter discusses the theoretical framework used in the study. In addition, a literature review is included. The literature review discusses patient education, health information technology, and patient portals. The benefits of use, provider and patient perceptions, and barriers patients encounter will be addressed in each section.

CHAPTER II – LITERATURE REVIEW

Chapter II will begin with a discussion of the theoretical framework used in this research study. Next, the current literature involving patient education, health information technology, and patient portals will be discussed. Patient education materials and self-management health tools such as patient portals are essential in patient management of chronic disease (Griffin et al., 2016). For this reason, the literature review will examine the uses of patient portals and which features patients are accessing and using the most often. Patient perspectives of patient portals will also be discussed, as well as barriers to patient portal use.

Theoretical Framework

The use of HIT and EHRs is essential for managing chronic health conditions (Ayanlade et al., 2019). EHRs provide healthcare providers information on patient conditions, treatments, and other relevant information needed for patient care. Patient portals encourage patients to manage and understand their disease. Both forms of HIT help reduce the number of complications patients experience as part of their disease (Ayanlade et al., 2019). The promotion of HIT is essential to improving health outcomes; however, patients must intend to measure, store, and manage their health information using HIT, such as patient portals. User intention and behavior must be understood to effectively promote portal use (J. Kim & Park, 2012). The Technology Acceptance Model (TAM), which examines user intention to use technology, is one of the most utilized theoretical frameworks to explore and document the acceptance of HIT (Ayanlade et al., 2019).

TAM was developed by Fred D. Davis in the late 1980s and is based on Fishbein and Ajzen's Theory of Reasoned Action (Ammenwerth, 2019). The goal of TAM is to understand better why users accept or reject technology. TAM is also used to understand how user acceptance can be improved through the design of the technology (Ammenwerth, 2019). The key to increasing the use of technology is increasing the acceptance of the technology (Holden & Karsh, 2010). Technology acceptance is examined by asking about future intentions to use the technology. If the factors that shape intent to use are known, those factors can be manipulated to promote acceptance of technology (Holden & Karsh, 2010).

To promote technology acceptance, TAM focuses on two questions:

1. Is the technology useful for me (perceived usefulness)?
2. Is the technology easy to use (perceived ease of use)? (Ammenwerth, 2019).

Perceived usefulness and perceived ease of use are of primary relevance for technology acceptance. Perceived usefulness is the expectation that the technology will be helpful. Perceived ease of use is the expectation that the technology is user-friendly and easy to use. Technology that is perceived as easy to use is a technology that is perceived as more practical. Perceived usefulness and ease of use both determine the attitude toward using the technology. The attitude then determines the behavior intention to use or the technology acceptance. TAM is considered the "key model" in understanding predictors for technology acceptance. In the review of TAM usage in healthcare, TAM can predict 30 to 70 percent of the variance in behavioral intention to use HIT (Ammenwerth, 2019).

For this study, TAM was used as the framework to quantitatively describe the behavioral intention to use patient portals among Mississippi adult residents. Research question three, which evaluated barriers to portal use, was used to determine the perceived usefulness and ease of use of patient portals. Research question five addressed patient portal user and non-user characteristics. Understanding user and non-user characteristics aided in the determination of barriers to portal use. Research question three also addressed the relationship between perceived usefulness and behavioral intention to use patient portals. Research question one, which addressed access to patient portals, also aided in determining the perceived usefulness and ease of use of patient portals. Research question four, which evaluated perceptions of portal use, evaluated perceived usefulness and how it ties to behavioral intention to use patient portals. The barriers adults in Mississippi encounter when using patient portals and their perceptions of portal use influence their intention to use portals and the education materials within those portals. Research question two was designed to evaluate the actual use of patient education materials. Research question one was designed to assess the perceived usefulness of patient portals and actual use of patient portals. To see how the research questions were applied to the TAM framework, please see figure 1.

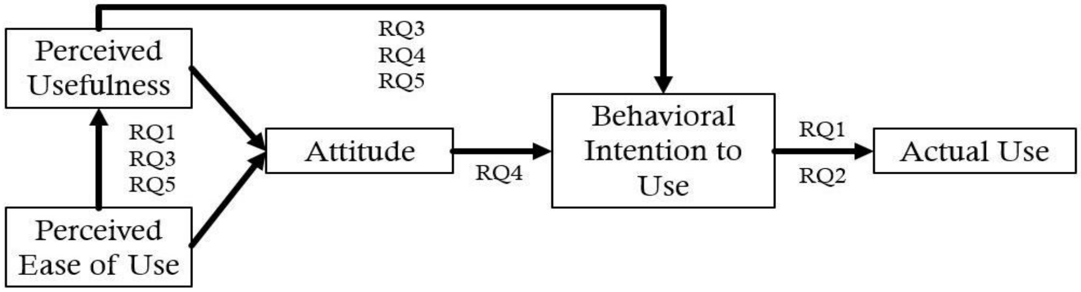

Figure 1. Technology Acceptance Model (TAM)

Using TAM as the framework for this study will hopefully aid in understanding adult Mississippi residents' intention to use patient portals and patient education materials. Understanding behavioral intention to use patient portals and education materials will aid in developing and implementing effective and efficient strategies to promote their use. The following section reviews the literature and includes patient education, health information technology, and patient portals.

Patient Education

Patient education is the steps undertaken to influence patient behavior and therefore produce a change in their knowledge, attitudes, and skills needed to maintain and hopefully improve their health ("Patient Education," 2000). Health educators and clinicians agree that a relationship exists between health and education (Atack & Luke, 2012). Educated patients gain the knowledge and skills needed to improve their quality of life through learning how to manage self-care and enhance decision-making about their healthcare choices (Atack & Luke, 2012). According to data from the Pew Research Center, in 2013, one in three adults in the United States used the internet specifically to determine what health condition they or someone they know might have (Volk & Obeid, 2019). Access to an unlimited amount of health information can be very beneficial; however, the high volume of data can leave the patient feeling overwhelmed and frustrated (Atack & Luke, 2012). Furthermore, the information found online varies in quality. If a patient views inaccurate, outdated, or erroneous information, it may lead to further anxiety, medical mistakes, and poor health outcomes. To prevent patient anxiety and medical errors, healthcare providers should direct patients to quality health education materials (Volk & Obeid, 2019).

Design of Online Patient Education

To promote the use of their approved online patient education (OPE), Win et al. (2016) aimed to identify patient preferences for the design features of OPE. In addition, they investigated the benefits OPE use provides patients. They reviewed current literature to determine the design features to include in the OPE. The design features were then tested by surveying patients and caregivers who used the OPE. Patient-tailored information and interactivity features were deemed the most essential of the design features. The credibility of the OPE content, such as the date of content display and healthcare provider logo, was also considered necessary by users of the OPE. Understanding the perceptions users have of OPE design will provide accurate health information and patient education materials to patients, reducing the anxiety that misinformation may cause, which benefits the patient with better health outcomes (Win et al., 2016).

Benefits of Online Patient Education

While investigating the positive design features of OPE, Win et al. (2016) also researched the benefits gained by users of OPE. By conducting a literature review, they discovered that OPE use could provide health and social benefits, with health benefits appearing to be more critical (Win et al., 2016).

Health Benefits

The first health benefit of OPE use is improving health outcomes, especially for patients with chronic diseases (Win et al., 2016). In combination with OPE use, continuing care helps patients maintain control of their disease and prevents complications. Second, OPE is a good source of health information, and the use of OPE improves patient disease-related knowledge. The knowledge gained from OPE use allows patients to manage their conditions correctly. One of the health benefits of OPE revealed through the Win et al. (2016) survey of patients is treatment adherence. Treatment adherence is a positive change in health behavior, and a positive change in health behavior leads to better patient health outcomes (Win et al., 2016).

Social Benefits

The literature review performed by Win et al. (2016) revealed several social benefits in addition to the health benefits. First, patients who utilize OPE in conjunction with consulting their healthcare provider to manage their disease spend less time at their healthcare provider's office than those who only seek information from their healthcare provider. Second, less time spent at the healthcare provider means less expense associated with travel to and from the medical facility. Finally, OPE use improves social support among patients with chronic diseases. Online health interventions such as OPE improve information seeking, comfort with care, confidence in the healthcare provider, social support, and information competence (Win et al., 2016).

Directing Patients to Accurate and Reliable Resources

Volk and Obeid (2019) performed a study at Michigan Medicine, which is part of the University of Michigan Health Systems. Providers used the Epic electronic medical record system to prescribe patients with online health information resources. Patients accessed the prescribed education materials through the education prescription feature in their patient portal. The education prescription feature directed patients to a physician-approved database of patient education materials. The database patients accessed was a variation of the Michigan Medicine Patient Education Clearinghouse initially developed for clinicians. The patients were given access to a second interface called Care Guides from Your Clinicians, dedicated to patient use. The second interface was specifically designed for patients and caregivers. It used plain language and intuitive navigation features. It was available for free, required no registration, and required no login. The number of visitors to the patient education prescription pages was evaluated. The number of visitors to the page was relatively the same as the number of patients seen in the clinic. The high percentage of active usage indicates that health information technology such as electronic medical records and patient portals proved to be an effective strategy for directing patients to accurate and reliable online patient education resources (Volk & Obeid, 2019).

Patient Perceptions of OPE

Atack and Luke (2012) performed a descriptive study using surveys and interviews to examine the satisfaction with the patient education website PEPTalk among 57 patients, community members, and clinicians living in a large Canadian city and a community in Northern Ontario. The website PEPTalk included clinician-reviewed materials developed for a sixth grade reading level and did not include complex medical terms or jargon. Patients logged onto the website from home or a community to access their prescribed education materials. Overall, participants of the study ranked their satisfaction with PEPTalk as moderately to highly satisfied. The participants thought the information provided on the education website was useful and relevant to their health condition, improved their health knowledge, and altered their health behavior. The use of health information technology (HIT) such as PEPTalk simplifies the patient education process and allows the user to be confident in the material they obtain (Atack & Luke, 2012).

Health Information Technology

HIT is the use of computer hardware and software for information processing, which involves the storage, retrieval, sharing, and use of healthcare information, data, and knowledge. The information gained is then used for communication and decision-making regarding a patient's healthcare (Kim & Park, 2012). The HITECH Act, passed in October 2012, encouraged hospitals to adopt electronic health records (EHRs) and other HIT forms and use them meaningfully. The use of HIT such as EHRs in a meaningful manner is defined as implementing EHRs at the hospital-wide level. To be used in a meaningful way, EHRs are not just adopted but are assimilated into hospital procedures through five processes (Wani & Malhotra, 2018). First, patient information is captured electronically. Second, electronic patient information is used to track clinical conditions. Third, lab tests and imaging results are integrated with the EHRs. Fourth, all providers have access to the patient information to coordinate care. Finally, the information in the EHR should be used to engage families and patients in their healthcare (Wani & Malhotra, 2018).

Meaningful Use of HIT

Wani and Malhotra (2018) wanted to determine if the meaningful use of EHRs was beneficial to patients. They used the informational processing theory to investigate hospital-wide HIT assimilation and determine if it improved the hospital's effectiveness. The study looked not only at the assimilation of HIT but the adoption as well; they looked at partial EHR adopters, full EHR adopters, and meaningful EHR assimilators. A longitudinal study was performed using patient-level data from 2010 to 2013 from all acute care hospitals in California and new data from the Medicare EHR Incentive Program that included meaningful use dates from 2010 onward. For patients in meaningful use hospitals (those in which EHR use was adopted and assimilated hospital-wide), the overall length of stay was reduced by a mean of three percent. The reduction of length of stay was increased for patients with greater comorbidity complexity and greater coordination complexity. There was also an overall decrease in readmissions. The reduced length of stay and reduced readmission rate was not evident with full adopters in non-meaningful use assimilated facilities; therefore, EHR must be assimilated in a meaningful manner to benefit the patients (Wani & Malhotra, 2019). For EHR and other HIT types to be assimilated in a meaningful manner, patients and healthcare providers must be willing to use the technology.

Perceptions of HIT Use

Ayanalde et al. (2019) performed a mixed-methods study using a questionnaire, observations, and a structured interview to evaluate patient and healthcare provider perceptions of HIT use. Nurses, doctors, laboratory personnel, pharmacy workers, information and communication technology (ICT) unit professionals, medical records officers, and type 2 diabetes mellitus outpatients were surveyed. Staff perceived that HIT would make their jobs easier and improve their job performance by allowing them to accomplish their daily tasks quickly. Patients perceived HIT would be helpful by enhancing their disease management plans. However, not all perceptions were positive. Staff feared the use of HIT would lead to loss of jobs, and patients feared security breaches. Both staff and patients agree that hospitals implementing HIT must offer continuous training to ensure staff and patients are comfortable with the technology (Ayanalde et al., 2019).

Mackert et al. (2016) were interested to see if health literacy played a role in the perceived usefulness and ease of HIT use. Participants were sent an online survey that included items to assess health literacy, use and perceptions of HIT, and demographic information. The Newest Vital Sign (NVS) measure of health literacy was used to evaluate participant health literacy. Patients with low health literacy were less likely to use HIT tools or perceive them as useful or easy to use. Those with a higher health literacy perceived use easy and were more likely to use HIT (Mackert et al., 2016)

The Benefit of HIT Use

There is a need for HIT to manage chronic health conditions such as diabetes mellitus (Ayanalde et al., 2019). HIT can help reduce the number of complications associated with patient care by providing physicians with information on patient conditions, treatments, and other relevant information. HIT can also help reduce complications by sending physicians alerts and reminders at the point of care. To avoid the complications associated with the poor management of chronic disease, patient-centered-web-based HIT, such as patient portals, may be used by patients to manage and understand their chronic disease (Ayanalde et al., 2019).

Patient Portals

Patient portals are a type of HIT that provide patients a direct link to their personal health information found in their EHR and a link to resources to aid in managing their health (Irizarry et al., 2019). Patient portals are secure websites through which patients may access their health information. Patient portals offer a practical solution for healthcare facilities that have implemented EHRs to meet the Centers for Medicare and Medicaid Services (CMS) Meaningful Use (MU) patient access regulations (Neuner et al., 2015). Patient portals provide patients access to the information in their EHR, such as medical test results, medication lists, discharge summaries, and immunization records. They may also use the portal to message providers and clinical staff, schedule appointments, request a medication refill, manage bills, and access patient education materials (Clark et al., 2015). Rodriguez (2018) discusses how patient portals may increase cancer patients' engagement in their healthcare. According to Rodriguez's firsthand experience and a literature review, patient portals allow patients to become engaged in their healthcare. Portals also enable patient-generated data to be entered into their EHR. The patient-generated data then aids the provider in care planning for the patient (Rodriguez, Elizabeth S., 2018). The 2014 stage 2 MU regulations were designed to encourage healthcare providers to promote patient portal use among their patients, promoting patient engagement in their healthcare (Neuner et al., 2015).

Meaningful Use of Patient Portals

Neuner et al. (2015) examined the potential of late adopters of EHR and patient portals to meet the Meaningful Use guidelines and patient expectations of portal use. To evaluate patient enrollment in portals, they examined the patient portal using electronic records, and in 2010, 13.2% of patients were enrolled in the patient portal. The enrollment number increased to 23.1% in 2012. Both numbers were above the five percent enrollment required to satisfy MU. In 2013, 87 to 100% of primary care, medical subspecialties, obstetrics and gynecology, neurology, and surgery clinics met the threshold for patient views of health information. MU also requires a certain percentage of patients to access preventive care information and email communications. Patient viewing of preventive care information varied greatly among specialty types, and only 38.2% of specialty clinics met the MU threshold for email communication. Most primary care clinics met all stage 2 MU patient access measures. Specialty clinics may struggle to meet the MU email communication threshold (Neuner et al., 2015).

Perzynski et al. (2017) were also interested in portal adoption and meeting the MU threshold of patient access to the messaging system. They performed a retrospective, observational study of EHR data. They examined it for patterns of use, revealing that most patients did not use the patient portal, with only 29.1% initializing portal use. However, 86% did access the messaging feature of the portal. Despite the low number of users, the urban public healthcare system met the MU threshold (5%) (Perzynski et al., 2017).

Impact of Portal Use on Patient Health Outcomes

The meaningful use of HIT, such as EHRs and patient portals, is designed to help reduce the complications patients experience due to poor management of their chronic disease (Ayanlade et al., 2019). The goal of patient portal use is patient involvement in their healthcare and improving their health outcomes (Atack & Luke, 2012). However, research shows a mix of positive and negative impacts on patient health outcomes.

Positive Impacts on Health Outcomes

The objective of a study by Nagykaldi et al. (2012) was to determine the impact of patient portal use on the delivery of patient-centered preventive care. The study findings suggest that using a comprehensive and prevention-oriented patient portal as part of routine patient care may increase patient involvement in their healthcare. Patient involvement was increased by encouraging them to print their wellness plan and then discuss it at their next visit to their healthcare provider. Patients also documented preventive health services such as immunization records and mammography, in addition to personal risk factors such as tobacco use and the presence of chronic health conditions. The patient entered personal health information (PHI) helped clinicians determine the appropriate follow-up testing and further preventive health services for each patient. Patient portal use by patients and providers had a clinically significant effect on the delivery of preventive health services such as age-dependent care and preventive care specific to patient needs. More patients received the needed preventive health services, improving health outcomes (Nagykaldi et al., 2012).

Negative Impacts on Health Outcomes

Portal use can have a negative impact on healthcare if the patient does not understand the information they are viewing. One feature of the patient portal is the ability of patients to view their laboratory test results. Fraccaro et al. (2018) conducted a controlled study with 20 kidney transplant patients. Participants viewed three clinical scenarios involving low, medium, and high-risk laboratory information and were asked how they would react if the results were theirs. Low-risk clinical scenarios included normal lab values that did not require action until the next appointment. Medium-risk clinical scenarios included a few abnormal lab results that needed further investigation, but no immediate action was required. High-risk clinical scenarios included laboratory values that deviated from the normal range, were life-threatening, and required immediate action. Patients consistently misinterpreted the risk, with 65% of them underestimating the need for action across all scenarios at least once, even when abnormal values were highlighted. Medium-risk clinical scenarios were the most difficult for patients to interpret. Sixty-five percent of participants underestimated the need for medical intervention, suggesting safety concerns must be considered when using patient portals to involve patients in their healthcare (Fraccaro et al., 2018).

In addition, Griffin et al. (2016) identified adults discharged from the hospital with acute myocardial infarction (MI), congestive heart failure (CHF), or pneumonia and reviewed their patient portal use to see if there was a connection between the amount of use and thirty-day hospital readmission. Out of the eligible patients, 83.4% did not use the patient portal, 8.6% were light users, and 8.0% were active users. Active users were 66% more likely to be readmitted than non-users, and there was no statistically significant difference between active and light users. They suggest that the high readmission rate may be due to patients with a chronic disease being the majority of users; readmission among a healthy population should be less (Griffin et al., 2016).

Perspectives of Patient Portal Use

Despite the possible positive and negative impact portals have on patient health outcomes, patients and physicians must be willing to use them. To promote portal use, numerous studies have been done evaluating patient and provider perspectives of portal use. Alpert et al. (2016) evaluated how well portals convey information to patients by interviewing patients and providers about their negative and positive experiences with patient portals.

Positive Patient Perspectives

Patient interviews performed by Alpert et al. (2016) revealed three areas of usefulness. First, patients liked the ability to access their medical information instantly.

For example, a mother waiting for test results could not call the office but could easily log in to the patient portal and obtain the results. Second, the portal design, which used large colorful icons, made the portal easy to navigate. Third, the ease of navigation made the portal simple for patients to monitor their health with the information found within the portal. The ease of use made monitoring their health with the portal more likely to occur (Alpert et al., 2016).

In the study performed by Powell and Myers (2018), patients' most frequently reported benefit was access to their personal health information (PHI). Patients appreciated the ability to compare laboratory data and look for positive and negative trends in their test results. The access to their PHI made patients feel more involved in their healthcare. Patients also thought the patient portal enhanced healthcare efficiency because the messaging center was easier to use than making a phone call (Powell & Myers, 2018).

Neuner et al. (2015) surveyed patients' satisfaction with the patient portal. More than 96% said they were satisfied with the portal overall, and 98% said they would recommend it to a friend or family member. Individual portal features were also reviewed, and the secure messaging with their provider was the feature with which they were most satisfied. Less than half of those surveyed reported being satisfied with the patient education located in the portal (Neuner et al., 2015).

Positive Healthcare Provider Perspectives

Alpert et al. (2016) revealed two categories of positive perspectives among providers. First, providers believed that patient access to medical information was beneficial to patient health by increasing patient motivation to change their health behaviors. For example, a patient tracking their cholesterol noticed it was too high and began exercising more to reduce the value. The increased motivation leads to more productive office visits because the patients are already educated and informed, so the provider spends less time leading the discussion, and the patients can ask informed questions. Second, providers stated that using patient portals leads to a more efficient working environment. For instance, clerks do not have to call patients to remind them about upcoming appointments; the reminders are delivered via the portal (Alpert et al., 2016).

Powell and Myers (2018) explored provider perceptions of portal use for the self-management of chronic diseases. The first category of perceived benefits is access to information. Providers valued the ability to archive patient data, which allowed them to look at trends in lab values, etc., to see if treatment plans were working. Providers also believed the portal allowed patients to participate in their healthcare actively. Patients could view test results and prepare questions before meeting with their provider. Second, providers believed portal use enhanced the efficiency and accuracy of patient care. Providers stated that using the messaging system in the portal was easier than making a phone call; the system was easily integrated into their daily routine and did not disrupt their workflow. Overall, providers had mixed perceptions of the portal potential for improving patient self-management of chronic diseases. Many were hopeful that portal use would benefit patient health outcomes (Powell & Myers, 2018).

Negative Patient Perspectives

The goal of Alpert et al. (2016) was to improve the design of their patient portal, which required the analysis of both positive and negative perspectives. Negative patient perspectives were classified into four main categories. The first category was the perceived lack of personalized content. Many patients were unaware that portal content was personalized and based on their EHR and self-reported information. They did not like what they believed to be standard content. The second category was the desire for direct communication with their healthcare provider. Patients wanted to communicate directly with a provider, not wait for a response to a message. The third category includes website functionality, such as issues logging in and server crashes. For example, one patient could not remember their password, and once recovered, they could not log in to the portal. If patients did not have trouble logging in, data entry errors led to inaccurate reports. One patient recently reported having a pap exam, but the portal kept telling her the test was overdue. Finally, patients also had problems interpreting their laboratory testing results. For instance, one patient had concerns about their BMI (body mass index) but did not understand the indicated value and felt he could not take the number seriously.

In their study, Powell and Myers (2018) revealed similar negative patient perspectives. First, patients had difficulty accessing the portal due to password, computer, or server problems. Either they forgot their password, or the server was down, so they never attempted to access the portal. Second, patients said the portal did not have features they deemed useful. For example, patients wanted to be able to change their preferred pharmacy or make payments online. Many portal features, such as entering data from home, are available, but patients did not realize the feature was there for them to use. Finally, patients preferred interacting with a person rather than the portal messaging system. Patients enjoyed talking to a person because they could ask follow-up questions if needed (Powell & Myers, 2018).

Negative Healthcare Provider Perspectives

Healthcare providers shared the same concerns as patients regarding patient access to portals. According to Alpert et al. (2016), negative provider perceptions overlapped patient negative perceptions. The main concern was a lack of feedback; providers were not informed when patients viewed information entered into the portal. Providers also thought the communication platform was unsuitable for complex and meaningful conversations. Another concern of providers was the possibility of increased workload due to increased patient phone calls. Providers worried that when patients viewed lab results and something was slightly abnormal, the patient would make an unnecessary phone call to the provider. The concern of increased workload relates to a lack of feedback. Because providers did not know if patients viewed messages, they had to call the patient and make sure the information was received. Finally, among providers, there was also an issue with inappropriate use of the system. Providers admitted to purposefully using complex medical jargon, and many physicians wrote notes to nurses, unaware patients could see them (Alpert et al., 2016). Powell and Myers (2018) uncovered provider-specific negative perceptions of portal use. First, lack of time was frequently mentioned. Providers stated they did not have time to encourage or teach patients to use the portal. Providers also perceived that reviewing patient-generated data would take too much time. Second, many providers were worried about MU regulatory barriers. One provider stated patient portals were an excellent tool for patient self-management of their health but was frustrated with the amount of data MU required to be monitored. Another provider said the government implemented patient portal use before the technology was ready. Because of the premature release of portals, they did not work well, and users who were initially excited about portal use lost interest (Powell & Myers, 2018).

Overall, providers thought more training was needed to help them with portal use (Powell & Myers, 2018). Many providers lacked experience with patient portals, so their perceptions of portal use to improve patient self-management of chronic disease were mixed. Many held favorable opinions, while others felt forced to use portals; however, most providers were hopeful that portal use could help improve patient health outcomes (Powell & Myers, 2018). To improve health outcomes, patients must perceive access to their PHI through their patient portal as important.

Perceived Importance and Usefulness of Patient Portals

To improve health outcomes, patients must perceive portal use and access to their PHI as useful. Peacock et al. (2017) used the Health Information National Trends Survey (HINTS) as their data source to review patient perspectives on patient portals and the importance of having access to their PHI. The study's primary objective was to compare patient perspectives with patient demographics. Data gathered from HINTS was utilized to determine the association of race/ethnicity with patient-perceived importance of PHI access, and use was evaluated. Ninety-two percent of adults surveyed believed access to their PHI via an online patient portal was very or somewhat important. When race/ethnicity was examined, no statistical difference in perceived importance was observed, in contrast to other studies examining differences among race/ethnicity (Peacock et al., 2017).

*Perceived Importance of Visit Notes***.** Patient portals provide access to lab results, education materials, appointment scheduling, and much more information found in PHI (Nambisan, 2017). Gerard et al. (2018) were interested in a specific section of the portal, visit notes, which are the notes made by the healthcare provider about their meeting with the patient. They were also interested in patient perspectives of vulnerable patient populations, specifically non-whites and less educated patients. They surveyed patients at an urban medical center who had an active portal account and asked how essential visit notes were to engage in their healthcare. Most patients believed reading visit notes was highly important; however, there was a statistical difference among formal education levels. Compared to patients with a master's or doctorate degree, patients with a high school education or less were twice as likely to perceive visit notes as necessary for managing their healthcare. There was also a significant difference in perceived importance between whites and non-whites. Blacks, Hispanic/Latino, and Asian patients consistently reported higher importance of visit notes than white patients. The study revealed that less educated and non-white patients were more likely to report reading visit notes as important to remember their care plan and understand how their provider thinks. Understanding how the provider thinks leads to transparency, which leads to greater patient trust in the provider. Reading visit notes helps to strengthen patient-provider relationships. Stronger patient-provider relationships may encourage patient engagement in their healthcare, leading to better patient health outcomes (Gerard et al., 2018).

*Parents Perceived Importance of Portals***.** Patient portals also allow caregivers, such as parents, access to the patients' personal health information (PHI). Clark et al. (2015) were interested in parents' current portal use and willingness to use portals in the future to conduct patient care activities for their child. Only 21% of respondents were even aware of patient portals; of that 21%, only 59% had activated the patient portal. Differences in perceptions of portal use among race/ethnicity and income level were examined. For parents who did not use the portal, the reasons for not activating the portal did not vary among race/ethnicity but the three income brackets. Parents in the high-income bracket stated they had no time, parents in the medium-income bracket said they had no need for portals, and parents in the low-income bracket did not know they needed to register for the portal. Users and non-users were concerned about the security of patient portals; they were worried someone would hack the portal and view their child's PHI. African American parents, non-Hispanic parents, and parents in low-income households were more likely than white parents and parents in high-income households to have portal security concerns. Despite concerns with portal use, nearly half of the parents perceived portals to interact with their child's healthcare provider and PHI as important (Clark et al., 2015).

Patient Readiness for Portal Use

Nambisan (2017) evaluated patient attitudes toward keeping a personal health record among patients seen in a free clinic. The free clinic was in a rural area of northern Virginia with poor access to healthcare (underserved population). The goal of understanding patient attitudes towards keeping a personal health record was to determine if patients were ready and willing to use a patient portal. Most participants stated they would be interested in keeping a personal health record if provided with help and support. These findings suggest patients are ready and willing to use patient portals (Nambisan, 2017).

Most patients across all races, ethnicities, and incomes believe in the importance of patient portals and access to their personal health information. However, perceiving patient portal use as important does not mean they will use patient portals. Furthermore, patients willing to use patient portals might be unable to do so.

Barriers to Patient Portal Use

Healthcare providers and manufacturers of EHR delivery systems have promoted patient portal use; however, patient use of portals has been low. Out of the meaningful use objectives that healthcare facilities must meet, reaching the five percent threshold of eligible patients using the portals has been challenging (Kamo et al., 2017). Minorities, the elderly, and patients with limited health literacy face many obstacles regarding patient portal use. To identify patient-reported barriers to portal enrollment, Goel et al. (2011) conducted a telephone survey of patients in an urban clinic who had not enrolled within thirty days of receiving an electronic invitation to participate in patient portal use. Twenty-six percent of the participants did not remember discussing the portal, 63% did not attempt enrollment even though they were informed about the portal, and 11% tried to enroll but were unsuccessful. Reasons for not attempting enrollment included lack of information or motivation (60%), negative attitudes toward the portal (30%), and connectivity issues (8%). While differences were seen among races, those differences were not statistically significant. The two most common reasons for lack of enrollment included a preference for the phone over email for communication with providers and security concerns; they felt the internet was not a secure venue for communication. Surprisingly, only four percent cited lack of internet access as a barrier, and only 10%

believed the patient portal to be too complicated to use. There was no variance between races (Goel et al., 2011).

Lack of Information

Peacock et al. (2017) discovered that a lack of information about patient portals was a barrier to enrollment. Their study found several demographic characteristics significantly associated with whether clinic staff informed them about patient portals. First, they discovered a significant difference across race and ethnicity in who was offered portal access by their healthcare provider. African Americans were offered access less often than whites. Also, Hispanic patients were offered access less often than non-Hispanics. Second, college graduates were more likely to be informed of patient portals than their less-educated counterparts. Third, differences in geographic location were apparent. Patients from non-metropolitan areas were less likely to be offered access to patient portals. Finally, age was a barrier to patient portal awareness. Patients 75 and older were less likely than younger patients to be informed about patient portals (Peacock et al., 2017).

Barriers among Minorities

Lyles et al. (2016) sought to understand the barriers to portal use among African Americans and Latino patients by conducting ten focus groups consisting of members not registered for portal use. Among the evaluation of the interview content, six themes emerged.

Technological Proficiency

The first theme that emerged was a lack of technological proficiency. Older adults and those with chronic illness were the most concerned with limited computer proficiency. One patient stated going online was a challenge for her. Themes two through five were directly linked to the patients' need to feel supported by and connected to healthcare providers.

Diminishing Personal Relationship

Theme two was the concern that using online tools would diminish their relationship with healthcare providers. For example, one patient stated his physician gave him more than 15 minutes and called him by name. Patients were concerned that portals would reduce the quality of care or replace face-to-face visits altogether.

Preference for In-Person Communication

Theme three involves preferring to communicate directly with their healthcare providers. Patients preferred face-to-face or phone communication. One person stated that they were not an email person, and when it came to their health, they preferred to be in the same room as their provider. After examining theme three more in-depth, it was revealed that the patients who preferred in-person communication felt they would not comprehend the information online as well as with an in-person discussion.

Lack of Portal Simplicity

Many participants stated they needed more support and technical assistance to use the portal regardless of existing computer use. One participant noted that they will not use it if it is complex. Another person stated they would probably forget their password. Many participants said they attempted to use the portal, got frustrated, and gave up.

The Complexity of Portal Content

Many participants found it hard to interpret the medical information provided if they did access the portal. One participant stated the amount of reading required was overwhelming. Another person wanted to know if the information was in the term they could understand; was it in simple terms.

Security of Online Information

The final theme was specific to African Americans. Compared to Latinos, African Americans were more concerned with the security and privacy of their personal health information found in the portal. For example, one participant said their medical history was their business, and they were concerned with hackers accessing their personal health information.

In summary, the primary barrier to portal use was a lack of support. Patients wanted technical assistance using the portal and were worried that it would diminish their relationship with healthcare providers. There was no variation between age, income, health conditions, or geographic region (Lyles et al., 2016).

Barriers among HIV Patients

The objective of the study performed by Luque et al. (2013) was to assess barriers to the use of online personal health records (PHRs) among persons living with human immunodeficiency virus (HIV). There were three main barriers to the use of online PHRs. The first barrier to portal use was cost. With most patients being from a low-income bracket, they could not afford a home computer or internet access. However, 82% reported internet access with devices such as smartphones or library computers at least once a month. Many also had internet access at work, through friends or family. The second barrier discovered was a lack of interest. Participants did not perceive access to their online PHR as useful. The final barrier found included computer skills and self-efficacy. The participants did not know how to access the online PHR. These barriers may be overcome by providing patients with training on accessing and using online PHRs (Luque et al., 2013).

Barriers among the Elderly

Gordon et al. (2016) performed a database survey of seniors aged 65 to 79 to identify possible barriers to patient portal use. The first barrier was age. Older seniors, aged 70 to 79, were significantly less likely than those aged 65 to 69 to have registered and used a patient portal. The second barrier was race and ethnicity. Black, Latino, and Filipino participants were significantly less likely than non-Hispanic white and Chinese participants to access and utilize a patient portal. There was no variation among the age groups. The third barrier to portal use was education level. Participants with a high school education or less were significantly less likely to access patient portals than their more educated counterparts. Finally, participants in fair or poor health were also less likely to have accessed their patient portal than those in better health (Gordon & Hornbrook, 2016).

Turner et al. (2015) were interested in older adults' barriers when using patient portals for personal health management. They conducted in-depth interviews of adults aged 60 years and older about their personal health information management. Participants were recruited from residential communities, assisted living facilities, and independent residences. Of the 74 participants interviewed, only twenty percent reported using a patient portal. There were variances between users and non-users regarding education level and living situation. Sixty-seven percent of users had a college education or higher compared to only 53% of non-users. Most portal users lived in a private residence, while most non-users lived in an assisted living facility or retirement home.

Portal non-users were divided into two groups, potential portal users and non-users, and barriers to portal use were examined.

Potential Portal Users

Potential portal users had previously used a portal or experienced them through a family member. They stated two main barriers to continued portal use. First, they no longer used portals due to problems logging in. For example, one user stated that they forgot the password and user ID because they do not always use them. Second, they noted that the cost of internet access was a barrier to portal use. One person said they would use their patient portal regularly if they could afford to have the internet at home.

Portal Non-Users

Portal non-users experience two main barriers. First, they had never heard of patient portals. Second, they cited personal reasons such as an aversion to computers and security concerns. One person stated they were not interested in using portals, while another said they were paranoid about computers (Turner et al., 2015).

Health Literacy as a Barrier

Elderly patients are not the only population at a disadvantage when it comes to having the means to access patient portals. Limited health literacy may also be a barrier to portal use. Patients with limited literacy skills have a limited ability to read and understand information and are more likely to participate in unhealthy behaviors; therefore, their actions are more likely to lead to poor health outcomes (Weiss, 2003). Health literacy is a person's knowledge of basic health information and their ability to utilize that information to make decisions about their health and healthcare ("Health Literacy Measurement Tools (Revised)," n.d.). Patients with limited literacy and limited health literacy are less aware of preventive health services. They also have less access to the preventive health services available, have less knowledge of their medical conditions, and are less likely to understand the self-care required to manage their condition (Kim & Xie, 2017; Weiss, 2003).

Sarkar et al. (2010) surveyed English-speaking diabetics and hypothesized that those with lower health literacy levels would use patient portals less than those with higher health literacy levels. Self-reported health literacy was measured, and of those surveyed, 62% reported some limitation in health literacy. Forty-three percent reported problems learning about health due to reading difficulties, 28% needed help reading materials related to healthcare, and 19% were not confident in filling out healthcare forms. Those with limited health literacy were less likely to use patient portals than those without self-reported limited health literacy, which supported the researchers' hypothesis (Sarkar et al., 2010).

Smith et al. (2015) wanted to establish whether health literacy was associated with patients registering for patient portal use. The patient sample was part of the Health Literacy and Cognitive Function among Older Adults study (LitCog). To assess health literacy levels, the Newest Vital Sign was used. Patients were required to read and then interpret information on a nutrition label. Six questions were asked, and one point was given for each correct answer. The more questions correct, the higher the person's health literacy. Patients with limited health literacy were less likely than patients with adequate health literacy to access their patient portal (Smith et al., 2015).

Summary

Health educators and healthcare providers agree that educated patients can self-manage their healthcare and make informed decisions about their healthcare. Online patient education is designed to get patients involved in their healthcare with information tailored to their needs (Atack & Luke, 2012). Patient education promotes a change in patient health-related behaviors and helps to improve health outcomes (Win et al., 2016).

Another method to involve patients in their healthcare is promoting the use of HIT, such as EHRs and patient portals. With the advent of Meaningful Use, patient portals and EHRs have become an essential component of healthcare and are helping to drive it toward a more patient-centered endeavor. Part of the patient-centered task of Meaningful Use requires education materials to be available within patient portals and for those education materials to be tailored to the patient (Griffin et al., 2016). Patients may use their personal health records, the messaging system within the portal, and the educational materials provided to be more engaged with their healthcare and hopefully become better educated on managing chronic diseases and preventing them. Patient portals are a useful avenue to support patient self-management of chronic disease through patient education of disease awareness and preventive measures, improving patient health outcomes. Despite their potential to improve health outcomes and quality of life, only a small group of patients use those (Tieu et al., 2015).

After reviewing the literature, most of the studies examined were conducted at one healthcare facility or in one geographical region, so the results could not be generalized and used when looking at other patient populations. Furthermore, many of the studies utilized online surveys, which excluded patients who did not have internet access. Specific patient populations, such as older adults, HIV patients, or only minority patients, were surveyed, which does not generalize results to other patient populations. The barriers to patient portal use may not be the same in all areas of the United States.

Electronic patient education works, and patient portals work; however, how to increase patient use of patient portals still needs a closer look. The next chapter will discuss the methodology used to determine patient portal use and patient education material use among adult patients in Mississippi and the barriers they face when using portals and education materials.

CHAPTER III - RESEARCH METHODOLOGY

With the advent of Meaningful Use, patient portals have become an essential means of communicating with and educating patients. The last phase of Meaningful Use requires health care facilities to provide electronic education materials to patients; however, many barriers prevent patients from accessing them. This chapter describes the research design employed to determine the barriers adult patients in Mississippi face regarding patient portal use and education materials found in those portals. The research participants, instruments of data collection, data collection procedure, and method of data analysis will also be discussed.

Research Design

Quantitative research methods, including descriptive statistics, survey data, and correlational statistics, were used to address the research questions developed for this study. Quantitative methods allow for the measurement and statistical analysis of data gathered via polls, questionnaires, and surveys. The data collected is quantifiable; the trends, attitudes, and opinions of the population as a whole may be obtained (Labaree, n.d.). Therefore, quantitative research methods are appropriate for collecting and analyzing the data obtained in this study.

Quantitative studies may be experimental, non-experimental, or quasi-experimental (Salkind, 2010). Non-experimental quantitative studies are appropriate when one wishes to describe a population or examine relationships between existing groups. This study was designed to determine the characteristics of users and non-users of patient portals (online medical records) and if they are accessing the educational materials found within their patient portal. The non-experimental design of this study allows for the determination of differences between two groups, users and non-users of patient portals. The conclusions drawn from this non-experimental study are descriptive in nature (Salkind, 2010).

One method utilized to collect data for quantitative descriptive studies is the use of surveys. Surveys are used to gather information about the population and describe population characteristics (Salkind, 2010). Research Questions 1 through 5 are as follows:

RQ1. Do adults in Mississippi have access to patient portals? If so, are the patient portals being utilized?

RQ2. Do adults in Mississippi utilize patient education materials located within patient portals?

RQ3. What barriers to patient portal use do adults in Mississippi face?

RQ4. What are the perceptions of patient portal use among adults in Mississippi?

RQ5. What are the characteristics of users versus non-users of patient portals?

Answers to Research Questions 1 through 4 were obtained using a survey. Data from the survey also provided descriptive statistics to answer Research Question 5.

Another quantitative research method is correlational research ("Quantitative Research," 2018). This study used a correlational research design to compare two groups: users and non-users of patient portals. This research design allows for correlating two or more variables using mathematical analysis methods. Patterns, relationships, and trends between variables may be observed ("Quantitative Research," 2018). Correlations were also used to perform a regression analysis to predict one variable's values from another (Salkind, 2010). A correlational design was employed to aid in answering Research Question 5.

Research Participants

The target population for this study is adult residents of Mississippi. The State of Mississippi has a population of 2,986,530 as of July 1, 2018, and 70.2% are over the age of 18, which would amount to approximately 2,096,544.06 adult residents ("U.S. Census Bureau QuickFacts," n.d.). The ideal sample size for a population of that number and a 95% confidence interval (CI) would be 385 ("Sample Size Calculator [Use in 60 seconds]," 2019). Unfortunately, the target sample size was not reached. After collecting data for two months, 225 responses were recorded. Three incomplete surveys were thrown out, and 222 complete surveys were obtained. For a 95% CI, a sample size of 222 brings the margin of error up to 6.6% from five percent.

Instruments of Data Collection

The data for this research project was collected via an electronic survey created with Qualtrics. The questionnaire is a modification of the National Cancer Institute's (NCI) Health Information National Trends Survey (HINTS) cycle 2 (*Survey Instruments | HINTS*, n.d.). The idea for the HINTS survey was conceived in 1997 at a risk communication conference attended by professionals from the disciplines of psychology, health behavior and education, public health, clinical medicine, and health journalism. NCI designed a cross-sectional, nationally representative survey of the United States adult population; the survey would collect data on health-related knowledge, attitudes, and behavior of those surveyed (Finney Rutten et al., 2020).

When developing the HINTS questionnaire, an advisory committee was formed to identify criteria for including measures on the survey instrument (Nelson et al., 2004). Criteria for inclusion focused on scientific validity, utility, and implementation. To achieve scientific validity, items included in the questionnaire must have demonstrated the ability to measure population-based constructs reliably. Several HINTS questionnaire items were taken from existing national-level surveys such as the CDC's Behavioral Risk Factor Surveillance System. Furthermore, external evidence should show the item's suitability for assessing the construct in question. To meet the utility criteria, the data collected with the questionnaire should be useful; the survey should provide data to aid population scientists in reducing the nation's burden from cancer. The implementation criteria covered operational issues and cognitive testing of the questionnaire items (Nelson et al., 2004). Before NCI administered the HINTS questionnaire, cognitive testing was performed (Finney Rutten et al., 2020). Cognitive testing, an evidence-based qualitative method used to determine if a questionnaire item gathers the intended data, is often used as a quality assurance measure (Willis & Artino, 2013). To determine if participants will interpret questionnaire items in the manner the researcher intended, cognitive testing requires interviewing individuals and presenting them with questionnaire items in the same way as survey participants will be delivered the final draft. As a quality assurance procedure, cognitive interviewing may be conducted before data collection, during data collection, or after survey administration (Willis & Artino, 2013).

HINTS regularly collects a national representative of data about the U.S. public's understanding of, attitude toward, and use of cancer and health-related information (*It*

Starts by Asking the Right Questions, n.d.). HINTS was first administered in 2002 and has been administered five times in the last fifteen years. Between each cycle, cognitive testing is performed to ensure the quality assurance of the questionnaire. NCI completed the last HINTS cycle, cycle five, in 2020 (Finney Rutten et al., 2020).

HINTS survey instruments are available to the public to use for free if interested in conducting a health communication survey; however, any HINTS-related published articles or measures derived from the use of HINTS surveys must be shared with the NCI (*Learn More About HINTS | HINTS*, n.d.). For this study, questionnaire items were borrowed from the HINTS survey and used as written. Other HINTS questionnaire items were modified without permission to better fit the study's scope.

The HINTS survey has fifteen sections covering topics from *Looking for Health Information* to *You and Your Household*. The scope of this study is patient portals, which are used to access online medical records, so only section D of the HINTS survey was used for this study. Section D asks 11 questions about online medical records access and use. Not all items from section D of the HINTS survey were utilized in the study questionnaire; HINTS survey items D2, D3, D5, and D9 were not included in the study questionnaire. HINTS survey items D1, D4, and D6 were not modified and included in the study questionnaire in their original format, while items D7, D8, D9, and D11 were modified to fit the scope of the study better. HINTS survey items D7, D8, and D9 include a list of statements and ask the participant to mark yes or no. These survey items were changed to “Mark all that apply.” The HINTS survey item D8 asks participants to mark yes next to line items that apply to their use of patient portals. To determine if participants are utilizing patient education materials found in patient portals, a line item, access educational materials, was added to D8. Research Question 1 is addressed with survey questions one through three and question six. Access to educational material was also added to survey item D9. Survey item D11, which asks how useful your online medical record is for monitoring your health, was changed to a matrix form and included all line items from D8. The original HINTS survey is located in Appendix B, and the study questionnaire may be found in Appendix C.

The study questionnaire is comprised of three sections. Section one includes items for consent to participate in research. Section two contains items that ask questions concerning online medical record access and use. Section three consists of a series of items designed to gather demographic data.

Data Collection Procedure

The data collection procedure was approved by the Institutional Review Board (IRB) of USM. See Appendix A for the approval letter. Data for this project was collected via a questionnaire created with Qualtrics. Social media, email, and a QR code were used to distribute the questionnaire to participants. The questionnaire was posted to social media and sent via email directly from the Qualtrics software. A recruitment letter with a detailed statement (Appendix D) outlining the purpose of the study was included with the email and the social media post. In addition to the purpose of the study, the participants were informed that there is no penalty for not completing the survey, and all results will remain anonymous. The email and social media post contained a link that took participants directly to the Qualtrics survey. The following email sources were used to distribute the questionnaire: the researcher's email address book, the USM listserv, and the professional contacts of the researcher. The email with the questionnaire link was sent once, with a reminder email (Appendix E) sent two weeks later. Two more emails were sent in addition to the first two.

The following social media sources were used to distribute the questionnaire: the researcher's Facebook page and the Facebook page of professional connections. In addition to posting the questionnaire link on Facebook, the link to the questionnaire was shared on the community help page on Facebook. The community help page allows Facebook members to request help, offer help, create a drive, or volunteer. The community help page reaches more than just personal Facebook contacts, expanding the pool of possible participants. The social media posts with the questionnaire link were posted weekly for two months.

A QR code, which may be scanned using a smartphone, and takes the participant to the questionnaire, was generated in Qualtrics and handed out at the researcher's church and gym. The same recruitment statement utilized with the email and social media posts was handed out with the QR code (Appendix F). The QR code and recruitment statement were included in the church bulletin for a month. They were also distributed at the gym once a week for a month.

Obtaining Participants' Consent

The participant consent procedure utilized was standard online informed consent. Included in the email and social media post was a detailed statement that outlined the purpose of the study and the topic of the questionnaire. The message consisted of a section that informed the participant that completing the survey is voluntary and all results are anonymous. The same statement was handed out with the QR code. The Qualtrics questionnaire item one asked the participant to consent to participate in the study (see Appendix C). If they clicked yes, then they were allowed to continue with the questionnaire. If they clicked no, then they were taken to the end of the survey. Only questionnaires of those who gave consent by clicking yes were collected.

The target population of this study was adult residents of the State of Mississippi. For this study, an adult is defined as a person 18 years of age or older. Questionnaire item two verified participant age and state of residency. If the participant was not 18 years of age or older and did not reside in Mississippi, they were directed to the end of the survey. Both requirements, age and residency, had to apply for participants to be allowed complete the questionnaire. Only surveys of participants who were 18 years of age or older and residents of the State of Mississippi were collected.

Data Storage and Disposal

The collected data was stored in the Qualtrics server. Qualtrics is General Data Protection Regulation (GDPR) compliant and provides its users with GDPR compliant technology. Once data collection was complete, the data was downloaded from Qualtrics as an excel file and password protected. The USB external storage devices used for storage were also password protected. The USB drives were kept in a locked desk drawer when not in use. The data will be held for five years and then destroyed.

Data Analysis

This study aimed to determine patient portal use among adults in Mississippi and determine if they use patient education materials found within patient portals. Furthermore, user versus non-user characteristics were determined to promote patient portal use better. Data was analyzed using IBM SPSS software.

Research Questions 1 and 2

RQ1 addresses patient portal access and utilization. A frequency distribution was utilized to determine the percentage of users versus non-users of patient portals. A frequency distribution shows how often each outcome occurs (Field, 2013). For this study, the outcome is the use or non-use of patient portals. RQ2 addresses patient education material use. A frequency distribution was also used to determine the percentage of portal users that utilize patient education materials.

Research Questions 3 and 4

RQ3 addressed barriers to patient portal use that non-users encounter. A frequency distribution table was used to determine the percentage of non-users that considered each item on survey question four a reason for not accessing their medical record online. Once the percentages for each category were tabulated, the barriers to patient portal use were described. RQ4 addresses the perceptions of portal use among adults in Mississippi. A frequency distribution table was utilized to determine what percentage of survey respondents consider accessing their online medical records useful or not useful.

Research Question 5

RQ5 addresses the characteristics of patient portal users and non-users. A regression enables the prediction of the dependent variable (patient portal use) given the independent variables (demographics); a regression allows for the description of the relationship between the independent and dependent variables ("Resources for Staff Resources > Training resources for Tutors from statstutor," n.d.). Instead of linear regression, logistic regression was used for data analysis. Unlike a linear regression that predicts the value of the dependent variable, a logistic regression predicts the probability of being in a dependent variable category given the independent variable (Field, 2013). This study was designed to predict patient portal use (survey item 3) given independent variables (demographics determined by survey items 10 through 16), making a logistic regression ideal for data analysis. Logistic regression was used to determine the strongest demographic predictors of patient portal use and non-use. Determining significant demographic predictors will aid in characterizing users and non-users of patient portals.

Summary

A quantitative, non-experimental study was performed to determine if adult residents of Mississippi are utilizing patient portals, the education materials in their patient portals, and the barriers they face to using patient portals. An electronic survey was distributed using the Qualtrics software; then, the data was analyzed using SPSS. A binary logistic regression was performed to determine the characteristics of users and non-users of patient portals. The next chapter discusses the results of the data analysis.

CHAPTER IV – RESULTS

This study aimed to investigate patient portal use among adult patients in Mississippi and determine if they have access to patient education materials within their patient portals. If so, are they utilizing the patient education materials? This study also investigated barriers to patient portal use that adult patients in Mississippi (MS) may encounter. Chapter IV will present the results of the analysis of the descriptive statistics. The results of the binary logistic regression will also be discussed. Each research question will be addressed individually.

Results

Descriptive statistics were utilized to answer RQ1 through RQ4. A logistic regression was performed using IBM SPSS software to answer RQ5. Descriptive statistics were also utilized to answer RQ5.

RQ1. Do adults in MS have access to patient portals? If so, are the patient portals being utilized?

The data analysis showed that out of 222 respondents, 217 (97.7%) knew that their healthcare providers maintained their medical records in a computerized system (patient portal). None of the respondents said their providers did not retain their medical records in a computerized system. Five (2.3%) did not know if their healthcare provider maintained their medical records in a computerized system. The majority (92.8%) of participants had been offered access to their online medical records. Only 5.4% of participants had never been offered access, and only 1.8% did not know if they had ever been offered access. See Table 1 for details. Among all participants, 82.9% had accessed their online medical records (patient portal) in the past 12 months (Table 2).

Among these users, 47.2% used a smartphone, 24.4% used a laptop, 25.3% used a desktop computer, and 3.1% used other devices such as an iPad or tablet (Table 3). The research results indicated that adult residents of MS are aware of and access their patient portals.

Table 1 *Awareness of Patient Portal*

	Yes		No		Don't Know	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Healthcare providers maintain medical records in computerized system	217	97.7	0	0.0	5	2.3
Offered online access to medical records by healthcare provider	206	92.8	12	5.4%	4	1.8

Table 2 *Patient Portal Use and Non-use*

	Yes		No	
	Frequency	Percent	Frequency	Percent
Accessed online medical record (patient portal) in the last 12 months	184	82.9	38	17.1

Table 3 *Device Used to Access Patient Portal*

	Frequency	Percent
Smartphone	153	83.2
Laptop	79	42.9
Desktop Computer	82	44.6
Other	10	5.4

RQ2. Do adults in MS utilize patient education materials located within patient portals?

Most (95.7%) participants reported utilizing their online medical records to look at test results. Other portal features accessed most often included securely messaging their healthcare provider (66.8%) and requesting medication refills (53.3%). Less than half of respondents used patient portals to download their health information (33.2%) and add health information to share with their healthcare provider (26.1%). Only 24 (13.0%) out of 184 portal users utilized their online medical records to access educational materials. The only two features used less than educational materials were to help decide how to treat an illness or condition (11.4%) and request correction of inaccurate information (8.7%). A small percentage of respondents (8.7%) reported accessing other portal features; other uses included making appointments and paying medical bills. See Table 4 for the number of respondents that reported using each portal feature.

When portal users were asked what features were available in their patient portals (Table 5), 88% of users reported a list of health/medical problems within their portal. The majority of users also reported the presence of clinical notes (85.9%), immunization or vaccination history (79.9%), and a list of allergies (78.3%) in their patient portals. Only 87 (47.3%) out of 184 portal users reported having access to educational materials in their patient portals. Even though nearly half of portal users are aware of the educational materials in their portal, just 13% are accessing the educational materials.

Table 4 *Portal Features Used*

	Yes		No	
	Frequency	Percent	Frequency	Percent
Request refill of medications	98	53.3	86	46.7
Request correction of inaccurate information	16	8.7	168	91.3
Securely message healthcare provider and staff	123	66.8	61	33.2
Download health information	61	33.2	123	66.8
Add health information	48	26.1	136	73.9
Help make a decision about treatment	21	11.4	163	88.6
Look up test results	176	95.7	8	4.3
Access educational materials	24	13.0	160	87.0
Other	16	8.7	168	91.3

Table 5 *Medical Information in Patient Portal*

	Frequency	Percent
List of health/medical problems	162	88.0
Allergy List	144	78.3
Clinical Notes	158	85.9
Immunization or vaccination history	147	79.9
Educational materials	87	47.3

RQ3. What barriers to patient portal use do adults in MS face?

The results indicated that only 38 (17.1%) respondents reported not accessing their online medical records in the last 12 months (Table 2). Seventeen (44.7%) portal non-users cited no need to use their online medical record as a reason for not using their patient portal. Preferring to speak to their healthcare provider directly was cited by 36.8% of portal non-users as a reason for not accessing their portal. Four (10.5%) stated not having an online medical record and finding it difficult to log in were barriers to portal use. Three (7.9%) reported having more than one online medical record and not having a way to access the portal website as a barrier. No one cited not being comfortable or experienced with computers as a barrier to portal use. Eight (21.1%) listed other reasons for not accessing their patient portal. Other reasons listed included needing time to set up, the doctor calling before looking at results, record not going back far enough, and they haven’t been to the doctor. The results indicate the main barrier to patient portal use among MS adult residents is a lack of need.

Table 6 *Barriers to Accessing Online Medical Records (Patient Portals)*

	Frequency	Percent
Prefer to speak to healthcare provider directly	14	36.8
Do not have way to access website	3	7.9
Do not need to use	17	44.7
Concerned about privacy or security	1	2.6
Don't have online medical record	4	10.5
Found it difficult to login	4	10.5
Not comfortable with computers	0	0.0
Have more than one online medical record	3	7.9
Other	8	21.1

RQ4. What are the perceptions of patient portal use among adults in MS?

This study indicated that 34.7% of participants found it easy, and 27% found it very easy to understand the health information in their online medical records. 20.3% of participants responded neutrally. Only 4.4% said the information was difficult or very difficult to answer (Table 7). Two out of 184 portal users did not respond to the survey item that asked how difficult it was to understand their patient portal's health information. Adult residents of MS perceive the information in their patient portal as easy to understand.

Table 7 *Understanding of Health Information*

		Frequency	Percent
Valid	Very difficult	1	.5
	Difficult	7	3.2
	Neutral	37	16.7
	Easy	77	34.7
	Very easy	60	27.0
	Total	182	82.0

When respondents were asked about the perceived usefulness of portal features (Table 8), the most useful feature was looking up test results. The majority (97.8%) of portal users reported online medical records as very useful or useful for looking up test results, with only 0.5% reporting this feature as not very useful. Zero respondents said looking up test results was not a useful feature, and one person said they do not use it. Eighty-one percent of portal users perceived the messaging feature of the patient portal to be very or somewhat useful, with only 3.2% of users finding the feature not very useful or not useful at all. Twenty-seven (14.7%) portal users do not use the portal messaging system. Over half (67.9%) of portal users consider the ability to request medication refills through the portal as very useful or somewhat useful. Few (5.9%) found this feature not very useful or not useful at all, and 25.5% do not use the feature. Many (63.6%) respondents also reported that portals were very or somewhat useful for downloading their health information. Only 2.7% reported the feature as not very useful, 0.0% said it was not useful, and 33.7% said they did not use it. Over half (59.3%) of users reported that portals were useful for sharing health information with their healthcare providers. Only 4.1% said the feature was not very useful, 0.0% said the feature was not useful at all, and 34.8% reported not using the feature at all.

Less than half (47.8%) of respondents stated portals are very or somewhat useful for helping them decide how to treat an illness or condition. Few (9.8%) noted the feature was not very useful or not useful at all, and 41.8% stated they do not use the feature. Only 45.1% of portal users noted the ability to access education materials was very or somewhat useful, and 7.6% stated the feature was not very useful or not at all useful. The rest (45.7%) said they did not use portals to access educational materials. Requesting correction of information was only reported as very or somewhat useful by 33.7% of portal users, and 3.8% stated the feature was not very useful or not useful. Over half (62.0%) said they did not use the portal feature. The results indicate that adult residents in MS perceive the most useful portal feature to be looking up test results. The least useful portal feature is requesting the correction of inaccurate information.

Table 8 *Perceived Usefulness of Portal Features*

	Very useful		Somewhat useful		Not very useful		Not at all useful		I do not use at all for this task	
	*F	P	F	P	F	P	F	P	F	P
Request refill of medication	97	52.7	28	15.2	8	4.3	3	1.6	47	25.5
Request correction of inaccurate information	34	18.5	28	15.2	4	2.2	3	1.6	114	62.0
Securely message provider	121	65.8	28	15.2	3	1.6	3	1.6	27	14.7
Download health information	87	47.3	30	16.3	5	2.7	0	0.0	62	33.7
Add health information	75	40.8	34	18.5	9	4.9	0	0.0	64	34.8
Help make a decision about treatment	54	29.3	34	18.5	16	8.7	2	1.1	77	41.8
Look up test results	166	90.2	14	7.6	1	0.5	0	0.0	1	0.5
Access educational materials	49	26.6	34	18.5	11	6.0	3	1.6	84	45.7

**F = Frequency; P = Percent*

RQ5. What are the characteristics of users versus non-users of patient portals?

A series of demographic survey items were included in the questionnaire. Participants were asked about their age, education level, ethnicity, race, sex, and income level. The results of demographic questions were used as the predictor (independent) variables in the binary logistic regression.

Age

Portal use versus non-use is listed by age in Table 9. Sixty-eight out of 222 respondents fell into the age range of 35-44 years. Forty-six were between the ages of 45-54 years, 35 between the ages of 55-64 years, and 31 between the ages of 25-34 years. Fifteen respondents were between the ages of 18 -24 years, and 21 were between 65-74. The least number of respondents, only 6, were 75 years or older.

Table 9 *Portal Use vs. Non-use by Age Group*

		In the last 12 months have you accessed your online medical record?					
		No		Yes		Total	
		*F	P	F	P	F	P
What is your age in years?	18 - 24	7	18.4	8	4.3	15	6.8
	25 - 34	4	10.5	27	14.7	31	13.9
	35 - 44	9	23.7	59	32.1	68	30.6
	45 - 54	6	15.8	40	21.7	46	20.7
	55 - 64	8	21.0	27	14.7	35	15.8
	65 - 74	2	5.3	19	10.3	21	9.5
	75 or older	2	5.3	4	2.2	6	2.7
Total		38	100	184	100	222	100

**F= Frequecy; P = Percent*

The majority (83.2%) of portal users were between 25-64 years. Only 10.3% were between 65 -74 years, with even less, 2.2%, 75 years or older. Very few (4.3%) were between 18-24 years. Over half (60.5%) of portal non-users were between 35-64 years. Seven (18.4%) out of 38 non-users were between 18-24 years, and 10.5% were between the ages of 25-34 years. The least number of non-users were 65 years or older, with 5.3% between 65-74 years and 5.3% 75 years or older.

Education Level

Portal use versus non-use listed by education level may be found in Table 10. Most (154 out of 222) survey respondents reported having a bachelor's degree or higher, with 34.7% having a bachelor's degree and 34.7% having a post-graduate degree. Thirty (14.4%) out of 222 respondents have an associate degree, 12.6% have some college with no degree, 3.2% have a high school diploma or equivalent, and 1.4% completed twelfth grade or less.

Table 10 *Portal Use vs. Non-use by Education Level*

		In the last 12 months have you accessed your online medical record?					
		No		Yes		Total	
		*F	P	F	P	F	P
What is your highest level of education?	12th grade or less	1	2.6	2	1.1	3	1.4
	High school diploma or equivalent	1	2.6	6	3.3	7	3.2
	Some college, no degree	4	10.5	24	13.0	28	12.6
	Associate's degree	9	23.7	21	11.4	30	14.4
	Bachelor's degree	13	34.2	64	34.8	77	34.7
	Post-graduate degree	10	26.3	67	36.4	77	34.7
Total		38	100	184	100	222	100

**F= Frequecy; P = Percent*

The highest education level of most (71.1%) portal users was a bachelor's degree or higher. For 24.4%, the highest level of education was an associate’s degree or some college, and 4.4% had a high school education or less. The highest education level for over half (60.5%) of portal non-users was a bachelor's degree or higher. For 34.2%, the highest level of education was an associate’s degree or some college, and 5.3% had a high school education or less.

Ethnicity and Race

Portal use versus non-use is listed by ethnicity in Table 11. Most (97.7%) respondents stated they were not Hispanic or Latino. Only 0.9% said they were Hispanic or Latino, and 1.4% preferred not to respond. All three participants who stated they preferred not to respond reported using their patient portal. Most (97.8%) portal users said they were not Hispanic or Latino, and 0.5% stated they were Hispanic or Latino. The majority (97.4%) of portal non-users also stated they were not Hispanic or Latino. Only one non-user said they were Hispanic or Latino.

Table 11 *Portal Use vs. Non-Use by Ethnicity*

		In the last 12 months have you accessed your online medical record?					
		No		Yes		Total	
		*F	P	F	P	F	P
Are you Hispanic or Latino?	Prefer not to respond	0	0.0	3	1.6	3	1.4
	Yes	1	2.6	1	0.5	2	0.9
	No	37	97.4	180	97.8	217	97.7
Total		38	100	184	100	222	100

**F= Frequecy; P = Percent*

Portal use versus non-use is listed by race in Table 12. Respondents were able to mark all race choices that applied. Four respondents chose not to answer the race question. The only category that had no respondents was other Pacific Islanders. Most (93%) respondents were white, and 3.5% were black or African American. Few (0.9%) respondents reported as American Indian or Alaska Native. A small percentage (0.9%) were also Asian.

Table 12 *Portal Use vs. Non-Use by Race*

		In the last 12 months have you accessed your online medical record?					
		No		Yes		Total	
		*F	P	F	P	F	P
What is your race? One or more categories may be selected. Mark all that apply	American Indian or Alaska Native	0	0.0	2	1.1	2	0.9
	Asian	0	0.0	2	1.1	2	0.9
	Black or African American	2	5.1	6	3.2	8	3.5
	Other Pacific Islander	0	0.0	0	0.0	0	0.0
	White	37	94.9	174	92.3	211	93.0
	Prefer not to respond	0	0.0	4	2.1	4	1.8
Total		39	100	188	100	227	100

**F= Frequecy; P = Percent*

Most (92.3%) portal users were white, 3.2% were black or African American, 1.1% were Asian, and 1.1% were American Indian or Alaskan Native. All four participants who stated they preferred not to respond to the race question reported using their portal. Most (94.9%) of portal non-users were also white. The only other races to report not using patient portals were black or African American.

Sex

Portal use versus non-use is listed by sex in Table 13. One participant chose not to answer the question about sex, and two participants chose the response to prefer not to say. Most (78.7%) respondents were female, and 20.4 % were male. Most (83%) portal users were female, and 15.8% were male. The two respondents who chose not to state their sex were portal users. Over half (57.9%) of portal non-users were female, and 42.1% were male.

Table 13 *Portal Use vs. Non-Use by Sex*

		In the last 12 months have you accessed your online medical record?					
		No		Yes		Total	
		*F	P	F	P	F	P
What is your sex?	Prefer not to say	0	0.0	2	1.1	2	0.9
	Female	22	57.9	152	83.0	174	78.7
	Male	16	42.1	29	15.8	45	20.4
Total		38	100	183	100	221	100

**F= Frequecy; P = Percent*

Annual Household Income

Portal use versus non-use is listed by income in Table 14. Not every respondent completed the survey item that asked about income; only 214 out of 222 completed the survey item. Of respondents that answered the question, 38.3% have an annual income of $100,001 or more, 18.2% between $80,001 - $100,000, 17.3% between $60,001 - $80,000, 14.5% between $40,001 - $60,000, 8.4% between $20,001 - $40,000, and 3.3% make less than $20,000 a year.

Table 14 *Portal Use vs. Non-Use by Income*

		In the last 12 months have you accessed your online medical record?					
		No		Yes		Total	
		*F	P	F	P	F	P
What is your annual household income?	Under $20,000	3	8.6	4	2.2	7	3.3
	$20,001 - $40,000	4	11.4	14	7.8	18	8.4
	$40,001 - $60,000	5	14.3	26	14.5	31	14.5
	$60,001 - $80,000	10	28.6	27	15.1	37	17.3
	$80,001 - $100,000	3	8.6	36	20.1	39	18.2
	$100.001 or over	10	28.6	72	40.2	82	38.3
Total		35	100	179	100	214	100

**F= Frequency; P = Percent*

Most (75.4%) portal users have an annual household income greater than or equal to $60,001. Only 24.6% of portal users earn $60,000 or less. More than half (65.7%) of portal non-users also have an annual household income of $60,001 or greater, and 34.2% have an income of $60,000 or less.

When portal users were compared to portal non-users, there was minimal variation in the characteristics of each group (Table 15). The only variation was in age. Portal users were between the ages of 25-64, had a bachelor’s degree or higher, were not Hispanic or Latino, were white, were female, and had an annual household income of ≥ $60,001. Portal non-users were between the ages of 25-64, had a bachelors’s degree or higher, were not Hispanic or Latino, were white, were female, and had an annual household income of ≥ $60,001.

Table 15 *Characteristics of Portal Users Vs. Non-Users*

	Portal Users	Portal Non-Users
Age	25-64 years	35-64 years
Education Level	Bachelor’s degree or higher	Bachelor’s degree or higher
Ethnicity	Not Hispanic or Latino	Not Hispanic or Latino
Race	White	White
Sex	Female	Female
Annual Household Income	≥ $60,001	≥ $60,001

Regression Results

A standard binary logistic regression was used to model the patient portal use binary variable (using portal use as the reference category). The predictor variables in this study were all recoded into binary variables: age, education level, sex, race, and income. During the recoding process of data analysis, the researcher created a group consisting of the demographic categories in which most portal users fall. Ages 18-44, having a post-graduate degree, being white, and having an income of $100,001 or higher was included in this group. The majority of participants in this study were female, so they were also included in the group. The remaining demographic categories were compared to this group. Results of the logistic analysis indicated that the five-predictor model provided a statistically significant predictor of patient portal access, $X^2(5, N = 214) = 15.301$, $p = .009$. The Naglekerke pseudo R^2 indicated that the model accounted for approximately 11.7% of the total variance.

Table 16 presents the partial regression coefficients, the Wald test, the odds ratio [Exp (B)], and the 95% confidence interval (CI) for odds ratios for each predictor. The Wald test indicated that sex was the only significant predictor of portal use. Females were approximately four times more likely than other sexes to use patient portals, controlling for age, education, race, and income.

Table 16 *Logistic Regression Output*

Variables in the Equation

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age_D	.112	.397	.079	1	.778	1.118	.514	2.433
	Edu_R	.585	.468	1.562	1	.211	1.795	.717	4.495
	Sex_R	1.389	.409	11.546	1	<.001	4.013	1.800	8.943
	RaceW_R	-.972	1.093	.791	1	.374	.378	.044	3.223
	Income_R	.582	.435	1.789	1	.181	1.790	.763	4.202
	Constant	1.147	1.122	1.046	1	.307	3.150		

a. Variable(s) entered on step 1: Age_D, Edu_R, Sex_R, RaceW_R, Income_R.

Classification success for the cases based on a classification cutoff value of .500 for predicting membership in the portal use group was moderately high, with an overall prediction success rate of 83.6%. The true-positive rate indexing the model's sensitivity was 1.000, and the false-positive rate (1-specificity) was 1.000 (i.e., the true-negative rate indexing the model's specificity was .000). This classification cutoff corresponded to a positive likelihood ratio of 1.000 and a positive predictive value of .836.

The predicted probabilities of membership in the portal use group were subjected to a ROC analysis to determine if the model's performance could be improved using an alternative decision threshold. The ROC curve is presented in Figure 2, and the area under the curve (AUC) was .706 (SE = .022); both visual inspection and the AUC value suggest that the fit of the logistic regression model is in the acceptable range.

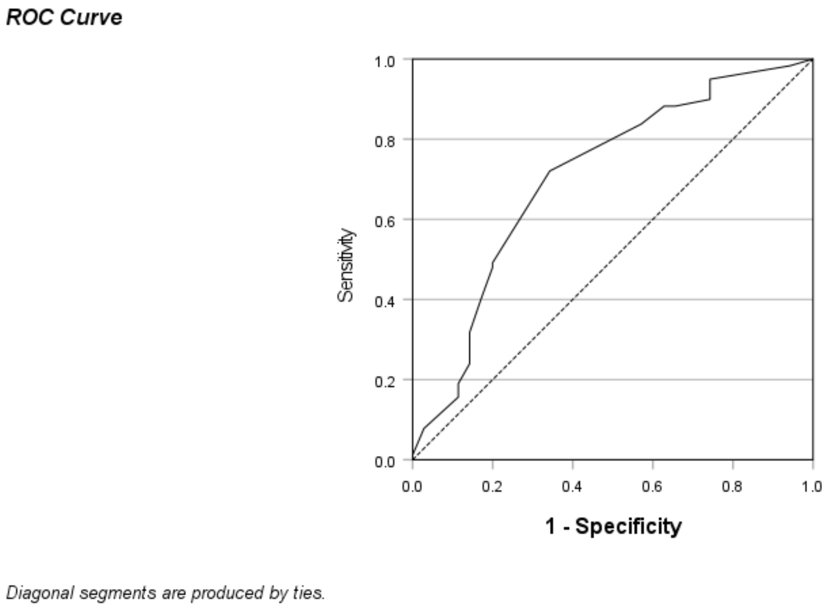

Figure 2. ROC Curve

Coordinates of the ROC curve corresponding to whole number predictions of group membership are shown in Table 17. The original classifications under a nominal probability of .500 correspond to the actual decision criterion of .000. Inspection of Table 17 suggests that by moving to a revised classification threshold of .786, the sensitivity would drop to .883, and the false-positive rate would drop to .629. Translated to frequency counts, a revised classification threshold of .786 would permit 158 of 179 successful cases to be correctly classified (true-positive frequency), with 13 of the 35 unsuccessful cases incorrectly classified (false-positive frequency). This alternative decision threshold was associated with a positive likelihood ratio of 1.40 and a positive predictive value of .878.

Table 17 *ROC Analysis Output*

Coordinates of the Curve

Test Result Variable(s): Predicted probability

Positive if Greater Than or Equal To[a]	Sensitivity	1 - Specificity
.0000000	1.000	1.000
.5575129	.983	.943
.6260720	.950	.743
.6811549	.927	.743
.6930505	.899	.743
.7417598	.883	.657
.7859197	.883	.629
.8018326	.860	.600
.8188755	.838	.571
.8347471	.721	.343
.8459123	.492	.200
.8723834	.480	.200
.8955311	.402	.171
.9005408	.318	.143
.9055390	.240	.143
.9161722	.190	.114
.9303044	.173	.114
.9364152	.156	.114
.9419580	.078	.029
.9535494	.011	.000
.9702737	.006	.000
1.0000000	.000	.000

The test result variable(s): Predicted probability has at least one tie between the positive actual state group and the negative actual state group. a. The smallest cutoff value is the minimum observed test value minus 1, and the largest cutoff value is the maximum observed test value plus 1. All the other cutoff values are the averages of two consecutive ordered observed test values.

Using the revised decision threshold of .786 reduced the true-positive rate and the overall correct classification rate; however, it has done a substantially better job of reducing the false-positive rate. Considering the losses and gains in prediction accuracy, the revised decision criterion appears to be distinguishable from the original default solution.

Summary

The majority of respondents (82.9%) reported accessing their patient portals within the past 12 months. Most (95.7%) survey respondents stated they used their portals to view test results. Few portal users (13.0%) accessed their education materials and utilized the portal-provided educational materials. Among respondents who reported not accessing their patient portal in the last 12 months, the main barrier was no need to view their online medical records. The second barrier was preferring to speak to their healthcare provider in person. Over half (61.7%) of portal users had no difficulty understanding the health information found in their online medical records. The portal feature perceived the most useful was looking up test results, and the least useful was education materials; these results aligned with the most accessed portal features.

The majority of patient portal users were between 25-64 years of age, had a bachelor's degree or higher, were not Hispanic or Latino, were white, were female, and had an annual household income of $60,001 or greater. The majority of non-users were between 35-64 years of age, had a bachelor's degree or higher, were not Hispanic or Latino, were White, were female, and had an annual household income of $60,001 or greater. There was no clear distinction between users and non-users based on the demographic data collected. The logistic regression did reveal sex as a significant predictor of portal use. Females are four times more likely than other sexes to utilize patient portals. The following chapter discusses the study's findings and offers suggestions for future research.

CHAPTER V – DISCUSSION

Patient education is an essential factor in improving health outcomes (Atack & Luke, 2012). Patients who are educated can make informed decisions about their healthcare. Furthermore, patients with access to educational materials tailored to their needs are more likely to benefit from the information (Atack & Luke, 2012). HIT, such as patient portals, is one method of providing personalized health educational materials. Patient portals provide patients with access to their EHR, allow them to communicate with their healthcare providers, and provide educational materials. Access to the information in their patient portal enables patients to be engaged in their healthcare and improve their health outcomes (Rodriguez, Elizabeth S., 2018).

This study aimed to investigate patient portal use among adults in Mississippi and determine if they utilized patient educational materials found in their portals. Barriers to portal use and perception of patient portal use were also investigated. Furthermore, it was hoped that through the description of portal users versus non-users that, portal use could be promoted more efficiently in Mississippi. Chapter V includes a summary of the research findings, conclusions drawn from the data, and suggestions for future research.

Discussion and Conclusions

The following section includes a discussion of the research findings and the conclusions drawn from the results. Descriptive statistics were employed to answer research questions one through four. Descriptive statistics and a binary logistic regression were utilized to answer research question five. The findings for each research question will be discussed individually.

Patient Portal Access and Utilization

The goal of RQ1 was to determine if adults in Mississippi (MS) had access to patient portals and if they were utilizing their patient portals. Despite being a rural state, the patients in MS do have access to patient portals. Most survey respondents (97.7%) were aware of their healthcare providers' use of EHRs. Also, 92.8% of respondents had been approached by their healthcare providers about accessing their EHR through a patient portal. The findings of this study varied from the literature. Peackock et al. (2017) discovered that a lack of information about patient portals was a barrier to portal use. Patients were not aware of their portals, so they did not use them. However, this study found that almost all patients (97.7%) in MS are aware of the existence of patient portals. In addition, 82.9% reported accessing their patient portal. These findings were the opposite of a study performed by Perzynski et al. (2017). Their survey of patients in an urban public health care setting only revealed 29.1% of patients accessing their portal. In contrast, adult residents of MS are aware of their portals and are accessing their portals.

However, the high percentage of survey participants accessing their portal may be misleading because the participants of this study were limited to those who are comfortable with technologies. The questionnaire for this study was distributed electronically by emailing to participants, posted on social media, and spread with a QR code. If the person uses email, social media, or QR codes, they are more likely to be comfortable with other technology such as patient portals.

Educational Material Access

The goal of RQ2 was to determine if patient portal users in MS are accessing the educational materials located within their portals. Patient portals are a means for patients to access their PHI. Patients can be involved in their healthcare by sending or receiving messages from/to their provider, requesting medication refills, and viewing educational materials (Clark et al., 2015). The portal features accessed most often were looking at test results and messaging their healthcare provider. Most (95.7%) portal users reported using their portal to view test results. Over half (66.8%) also reported using their portal for messaging their healthcare providers securely. These results aligned with studies performed by Neuner et al. (2015) and Perzynski et al. (2017). Both studies revealed that the messaging system and viewing test results were the most utilized portal features.

This study found that adult residents of MS use their patient portals but do not use the educational materials in their portals. The study results show that only 13.0% of participants accessed educational materials; however, 47.3% were unaware that educational materials were located in their portal. The high percentage of portal users unaware of the educational materials in their portal could contribute to the low number of people utilizing the portal feature.

Barriers to Patient Portal Use

The goal of RQ3 was to investigate barriers to patient portal use in MS. From a literature review, a common barrier to portal use was a lack of awareness of their patient portal. In a study by Goel et al. (2011), 26% of participants did not remember discussing the portal with their healthcare provider. Peacock et al. (2017) and Turner et al. (2015) also revealed that a lack of information about patient portals was a barrier to portal use.

The percentage of portal non-users who were unaware of access to their patient portal was slightly lower than in the literature. Only 13.2% of portal non-users did not know if their healthcare provider kept their medical record in a computerized system.

A study by Lyles et al. (2016) revealed a lack of technical proficiency as a barrier to patient portal use. In contrast to the study by Lyles, no portal non-users cited a lack of technical ability as a barrier. Although no one cited problems using computers as a reason for not using their portal, 10.5% of non-users did cite difficulty logging in (i.e., forgetting their password) as a barrier, which was also a barrier to portal use in the Lyles et al. (2016) study. A lack of proficiency with computers was not a significant barrier to portal use among participants of this study. The distribution of the questionnaire in an electronic format may have skewed the results. Participants used computers, smartphones, and tablets, which infers proficiency with technology.

This study agreed with the literature only regarding one barrier. Those who do not use patient portals to access their online medical records prefer to speak with their healthcare provider directly. Among non-users, 36.8% cited this as a barrier, which concurs with the Lyles et al. (2016) study and a study by Powell and Myers (2018).

The main barrier to portal use revealed by this study was the lack of a need to use their online medical record or patient portal, with 44.7% of non-users citing it as a reason for not utilizing their portal. This barrier was not mentioned in the literature and is unique to this study. According to the literature, most portal users are individuals with chronic health conditions. The majority of users fell into the age range of 25-64 years, and they may not yet have any chronic conditions that would warrant the need for frequent visits to their healthcare provider.

Perceptions of Portal Use

The goal of RQ4 was to determine the perception of patient portal use among adults in MS. Portal users were asked about the perceived usefulness of various portal features and how well they understood the health information found in their patient portals. More than half (61.7%) of portal users perceived the health information found in their online medical records as very easy or easy to understand. Only 4.4% thought the information in their portal was difficult or very difficult to understand. The majority of portal users have a bachelor's degree or higher, which could explain why many users had no difficulty understanding their health information.

This study indicated that test results and messages from healthcare providers are the most useful features, which agreed with a study performed by Alpert et al. (2016). Alpert et al. (2016) revealed less than half of portal users were satisfied with portal educational materials. This study aligned with their research in that only 26.6% of portal users thought educational materials were useful. The low percentage of users who perceive educational materials useful could contribute to the low rate of portal users accessing their educational materials.

Characteristics of Portal Users versus Portal Non-users

The goal of RQ5 was to describe the characteristics of portal users and non-users through the collection of demographic information. The majority of respondents who used patient portals were between the ages of 25-64 years, had bachelor’s degrees or higher degrees, were not Hispanic or Latino, were white, were female, and had an annual household income of greater than or equal to $60,001. These results were similar to those found in the literature. Gordon et al. (2016) determined age, race, ethnicity, and education level were barriers to portal use. The literature revealed individuals under 70 years of age, non-Hispanic, white, and above a high school education were most likely to access their patient portals.

Portal non-users in this study fell into very similar demographic categories as portal users. The majority of non-users were between the ages of 35-64, had a bachelor's degree or higher, were not Hispanic or Latino, were white, were female, and had an annual household income greater than or equal to $60,001. The only difference between users and non-users was the age range. Table 17 compares the demographics of portal users versus non-users.

A standard binary regression was performed to predict the characteristics of portal users. The predictor variables were age, education level, sex, ethnicity, race, and income. A literature review revealed that most portal users were under 70 years of age, non-Hispanic, white, and above a high school education (Goel et al., 2016). During data analysis, the predictor variables were recoded into binary values. A group was created to use as the comparison category of the regression; this group included having a post-graduate degree, being white, and having an income of $100,001 or higher. Females were also included in this group. The only statistically significant predictor of portal use was sex, with females being four times more likely than other reported sexes to utilize patient portals.

The sample for this study was a convenience sample, which could have biased the results. The survey was distributed through a university listserv, and the majority of members are college faculty and staff. The make-up of listserv members could account for the high number of respondents having a bachelor’s or post-graduate degree. The survey was also distributed through the MS branch of the American Society of Clinical Laboratory Science social media page and to medical laboratory science contacts of the researcher. The medical laboratory science field is mostly female, which could account for the high number of female respondents. Despite the limitations with the sample's demographic make-up, the logistic analysis results indicated that the five-predictor model provided a statistically significant predictor of portal use, $X^2(5, N = 214) = 15.301$, $p = .009$. However, the only significant predictor of portal use was sex, with females being four times more likely than other sexes to access their patient portals.

Recommendations for Healthcare Providers

Adult residents in MS have taken the first step of engagement in their healthcare. Adult residents in MS are accessing their patient portals. The main barrier for the few who are not using their portals is no need to use them. Patients may feel they do not need to use them because they are not sick. In the United States, seven out of ten deaths are related to chronic diseases, and the mortality rates due to chronic diseases in MS are higher than the national average (Gamble et al., 2012). The development of chronic disease leads to higher medical costs for the patient and the healthcare community in MS (*National Action Plan to Improve Health Literacy: Summary*, 2010). Healthcare providers need to inform patients of the importance of portal use in preventing chronic diseases.

The next step is for more of them to use the personalized educational materials found in their patient portals. The majority of portal users were not aware of the educational materials found in their portal. Healthcare providers need to inform patients of these materials. Patients who use those materials are more likely to participate in good health-related behaviors (Atack & Luke, 2012). Patient portal use and educational material use promote a change in patient health-related behavior and eliminate risk factors for developing chronic disease (Win et al., 2016).

Healthcare providers play a pivotal role in the education of their patients. Adult residents of MS are using patient portals but not accessing all the features. They are unaware of all the features or do not perceive them as valuable. If possible, healthcare providers should educate patients on using their portals. Patients need to be made aware of all portal features available and how they can utilize patient portals to make informed decisions about their healthcare.

Limitations

The major limitation of this study was the homophily involved with the convenience sample. The author of this study is a white, college-educated female between 35-44 years. The majority of respondents fall into those categories, which results from the researcher distributing the questionnaire through personal email and social media accounts. Despite the overwhelming percentage of female respondents, the logistic regression predicted portal users and non-users, with sex being a significant predictor.

The other major limitation was the distribution format of the questionnaire. The barrier to portal use of problems using technology cannot be accurately assessed using an electronic questionnaire. Using an electronic survey might be why a lack of proficiency with technology was a barrier in the literature and not in this study. The limitations mentioned need to be considered when interpreting the study's results or applying them to future research.

Suggestions for Future Research

Adult residents of MS appear to be using patient portals; however, they are not accessing the educational materials found in those portals. Almost half of the portal users are unaware that their portals have educational materials. Future research should focus on the usability of patient portals and how patients interact with them. Almost half of the survey respondents access their patient portal with a smartphone. Studies should be performed to make sure patient portals are smartphone friendly. If portals are not smartphone friendly, it may be hard for patients to see all the features available. If a smartphone is their only method of accessing their portal, and they cannot view it with a smartphone, they might not access their portal.

A qualitative study would reveal more about patient portal use and patient educational material use perceptions. Due to COVID-19, data was collected with an electronic survey. Participants had basic technology skills, internet access, smartphones, and other means to access patient portals. Participants were comfortable with technology. A qualitative study would be critical for reaching residents of MS that do not have access to technology such as computers, the internet, or smartphones or are not comfortable using technology. The sample for this study was a convenience sample and was primarily comprised of highly educated white females. Future research should include a more diverse sample that better represents the population of MS. Patients with limited health literacy are less likely than those with adequate health literacy to access their patient portal (Sarkar et al., 2010; Smith et al., 2015). This study did not address the barrier of health literacy. Future studies should include this barrier, which could impact patient use of educational materials.

Summary

This study revealed that adults in MS have access to patient portals and are using their patient portals; however, they are not accessing the educational materials within their portals. The use of educational materials helps to improve patient health outcomes, and poor health outcomes lead to higher medical costs (*National Action Plan to Improve Health Literacy: Summary,* 2010). Chronic disease is a significant concern in the state of MS (V. Short, 2014), so it behooves healthcare professionals in MS to promote portal use and urge patients to access the educational materials found in those portals.

The main barriers to portal use in MS include no need to use their portals and a preference for speaking to their healthcare provider in person. Educating patients about the importance of portals and their functionality could help alleviate these barriers. According to a review of the literature, minorities, those of low socioeconomic standing, the elderly, and those with limited health literacy encounter the most obstacles to patient portal use (Goel et al., 2011; Luque et al., 2013; Lyles et al., 2016; Peacock et al., 2017; Turner et al., 2015). The majority of respondents to this questionnaire were white, of high socioeconomic standing, ages 25-64 years, and well educated. Females are four times more likely than other sexes to access patient portals. Even though most respondents utilize portals, the sample was not diverse. It may not accurately depict portal use, educational material use, perceptions of patient portals, or barriers to portal use in the population of MS.

This study revealed that adults in MS are utilizing patient portals but not educational materials in those portals. They are engaged in their healthcare, which does help improve health outcomes. To further improve the health outcomes of adults in MS, they need to be educated about all the features available in their portal. Almost half of the study participants were unaware of the educational materials in their portals. Educated patients make better decisions about their healthcare than uneducated patients (Atack & Luke, 2012). To create a healthier MS, adult residents need to be informed about all features in their patient portal, the importance of utilizing all components, and encouraged to keep taking an active part in their healthcare.

APPENDIX A – IRB Approval Letter

Office of Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

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NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

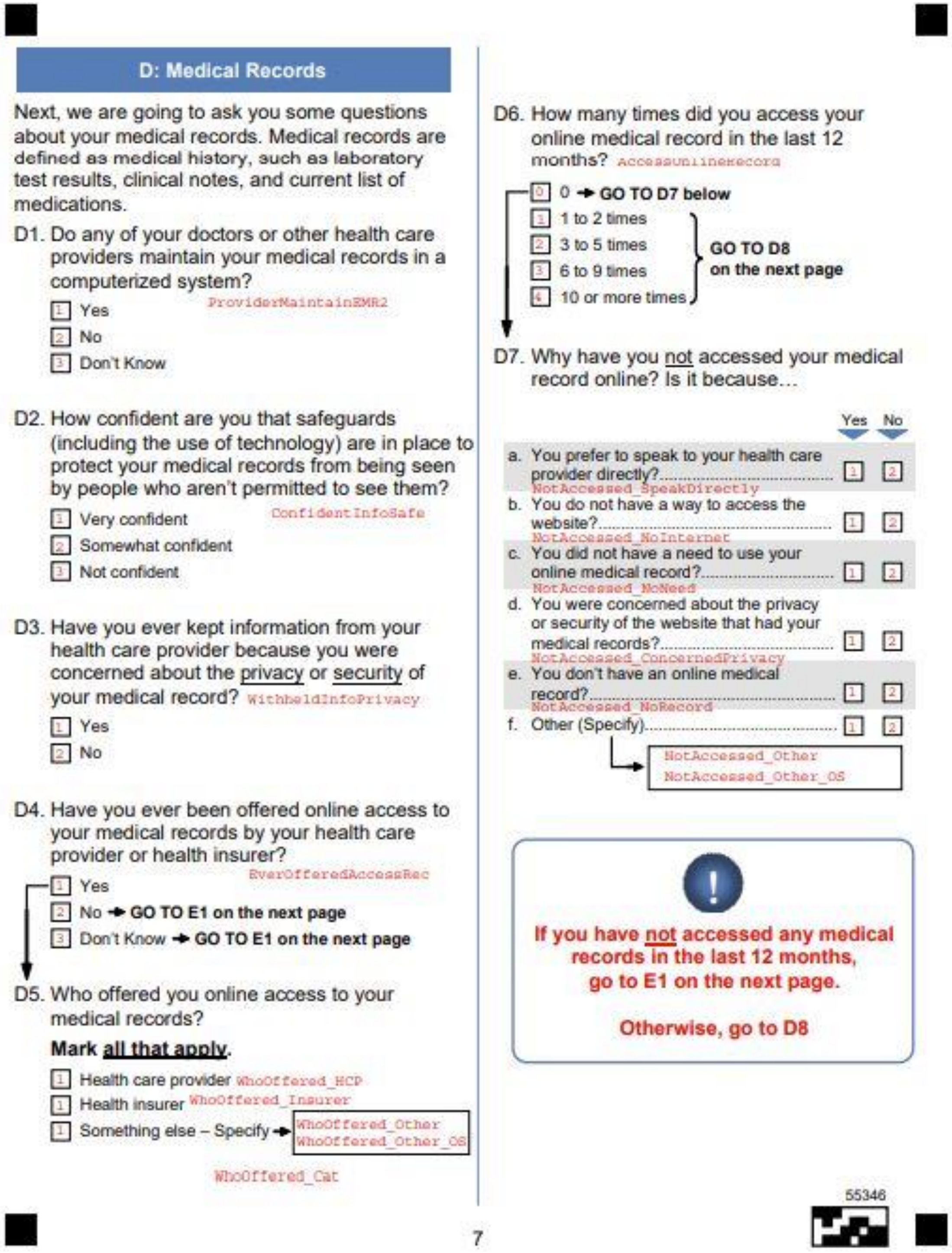
- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident submission on InfoEd IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER:	21-240
PROJECT TITLE:	Barriers to Patient Portal Use and Access to Patient Education Materials among Mississippi Adult Residents
SCHOOL/PROGRAM	School of Leadership
RESEARCHERS:	PI: Anna Swann Investigators: Swann, Anna~Wang, Shuyan~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	09-Feb-2022 to 08-Feb-2023

Donald Sacco Jr.

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

APPENDIX B – HINTS Survey Section D



D: Medical Records

Next, we are going to ask you some questions about your medical records. Medical records are defined as medical history, such as laboratory test results, clinical notes, and current list of medications.

D1. Do any of your doctors or other health care providers maintain your medical records in a computerized system? ProviderMaintainEMR2

☐1 Yes
☐2 No
☐3 Don't Know

D2. How confident are you that safeguards (including the use of technology) are in place to protect your medical records from being seen by people who aren't permitted to see them? ConfidentInfoSafe

☐1 Very confident
☐2 Somewhat confident
☐3 Not confident

D3. Have you ever kept information from your health care provider because you were concerned about the privacy or security of your medical record? WithheldInfoPrivacy

☐1 Yes
☐2 No

D4. Have you ever been offered online access to your medical records by your health care provider or health insurer? EverOfferedAccessRec

☐1 Yes
☐2 No → **GO TO E1 on the next page**
☐3 Don't Know → **GO TO E1 on the next page**

D5. Who offered you online access to your medical records?

Mark <u>all that apply</u>.

☐1 Health care provider WhoOffered_HCP
☐1 Health insurer WhoOffered_Insurer
☐1 Something else – Specify → WhoOffered_Other WhoOffered_Other_OS

WhoOffered_Cat

D6. How many times did you access your online medical record in the last 12 months? AccessOnlineRecord

☐0 0 → **GO TO D7 below**
☐1 1 to 2 times
☐2 3 to 5 times
☐3 6 to 9 times
☐4 10 or more times

GO TO D8 on the next page

D7. Why have you <u>not</u> accessed your medical record online? Is it because…

	Yes	No
a. You prefer to speak to your health care provider directly? NotAccessed_SpeakDirectly	☐1	☐2
b. You do not have a way to access the website? NotAccessed_NoInternet	☐1	☐2
c. You did not have a need to use your online medical record? NotAccessed_NoNeed	☐1	☐2
d. You were concerned about the privacy or security of the website that had your medical records? NotAccessed_ConcernedPrivacy	☐1	☐2
e. You don't have an online medical record? NotAccessed_NoRecord	☐1	☐2
f. Other (Specify) → NotAccessed_Other NotAccessed_Other_OS	☐1	☐2

If you have <u>not</u> accessed any medical records in the last 12 months, go to E1 on the next page.

Otherwise, go to D8

7

55346

D8. In the past 12 months, have you used your online medical record to...

	Yes	No
a. Request refill of medications? RecordsOnline_RefillMeds	☐ 1	☐ 2
b. Fill out forms or paperwork related to your health care? RecordsOnline_Paperwork	☐ 1	☐ 2
c. Request correction of inaccurate information? RecordsOnline_RequestCorrection	☐ 1	☐ 2
d. Securely message health care provider and staff (for example, e-mail)? RecordsOnline_MessageHCP	☐ 1	☐ 2
e. Download your health information to your computer or mobile device, such as a cell phone or tablet? RecordsOnline_DownloadHealth	☐ 1	☐ 2
f. Add health information to share with your health care provider, such as health concerns, symptoms, and side effects? RecordsOnline_AddHealthInfo	☐ 1	☐ 2
g. Help you make a decision about how to treat an illness or condition? RecordsOnline_MakeDecision	☐ 1	☐ 2

D9. Do any of your online medical records include the following types of medical information?

	Yes	No	Don't know
a. List of health/medical problems RecordsOnline_HealthProbs	☐ 1	☐ 2	☐ 3
b. Allergy list RecordsOnline_Allergies	☐ 1	☐ 2	☐ 3
c. Summaries of your office visit RecordsOnline_VisitSummary	☐ 1	☐ 2	☐ 3
d. Clinical notes RecordsOnline_ClinNotes	☐ 1	☐ 2	☐ 3
e. Immunization or vaccination history RecordsOnline_Immunizations	☐ 1	☐ 2	☐ 3

D10. Have you electronically sent your medical information to….?

	Yes	No
a. Another health care provider? ESent_AnotherHCP	☐ 1	☐ 2
b. A family member or another person involved with your care? ESent_Family	☐ 1	☐ 2
c. A service or app that can help manage and store your health information? ESent_HealthApp	☐ 1	☐ 2

D11. In general, how useful is your online medical record for monitoring your health?

UsefulOnlineMedRec

- ☐ 1 Very useful
- ☐ 2 Somewhat useful
- ☐ 3 Not very useful
- ☐ 4 Not at all useful
- ☐ 5 I do not use my online medical record to monitor my health

E: Caregiving

E1. Are you currently caring for or making health care decisions for someone with a **medical, behavioral, disability, or other condition?**

Mark all that apply.

- ☐ 1 Yes, a child/children Caregiving_Child
- ☐ 1 Yes, a spouse/partner Caregiving_Spouse
- ☐ 1 Yes, a parent/parents Caregiving_Parent
- ☐ 1 Yes, another family member Caregiving_AnotherFa
- ☐ 1 Yes, a friend or other non-relative Caregiving_Frien
- ☐ 1 No → **GO TO E11 on page 10** Caregiving_No

CaregivingWho_Cat

E2. Do you provide any of this care professionally as part of a job (for example, as a nurse or professional home health aide)?

Caregiving_Professional

- ☐ 1 Yes
- ☐ 2 No

APPENDIX C Patient Portal Questionnaire

Q1

I understand that participation in this project is completely voluntary, and I may withdraw at any time without penalty or prejudice. All personal information will be kept strictly confidential, including my name and other identifying information. By clicking the box below, I give my consent to participate in this research project. ***If you do not wish to participate in this study, please close your browser now.***

○ Yes, I consent to participate

○ No, I do not consent to participate

Skip To: End of Survey If I understand that participation in this project is completely voluntary, and I may withdraw at an... = No, I do not consent to participate

Q2 I am 18 years of age or older and a resident of Mississippi. ***If you do not meet this criteria, please close your browser now.***

○ Yes

○ No

Skip To: End of Survey If I am 18 years of age or older and a resident of Mississippi. If you do not meet this criteria, p... = No

End of Block: Consent to Participate in Research

Start of Block: Medical Records

Q3 Do any of your doctors or other healthcare providers maintain your medical records in a computerized system?

○ Yes

○ No

○ Don't Know

Q4 Have you ever been offered online access to your medical records by your healthcare provider?

○ Yes

○ No

○ Don't Know

Q5 In the last 12 months have you accessed your online medical record?

○ Yes

○ No

Display This Question:

If In the last 12 months have you accessed your online medical record? = Yes

Q6 What type of device did you use to access your online medical record? One or more categories may be selected. **Mark <u>all that apply</u>**.

☐ Smartphone

☐ Laptop

☐ Desktop Computer

☐ Other, please specify

____

Page Break

Q7 Why have you NOT accessed your medical record online? One or more categories may be selected. **Mark <u>all that apply</u>.**

☐ You prefer to speak to your healthcare provider directly?

☐ You do not have a way to access the website?

☐ You did not have a need to use your online medical record?

☐ You were concerned about the privacy or security of the website that had your medical records?

☐ You don't have an online medical record?

☐ You found it difficult to login (for example, you had trouble remembering your password)?

☐ You are not comfortable or experienced with computers?

☐ You have more than one online medical record?

☐ Other, please specify ____________________

Display This Question:

If In the last 12 months have you accessed your online medical record? = Yes

Q8 In the past 12 months have you used your <u>online</u> medical record (patient portal) to... One or more categories may be selected**. Mark <u>all that apply</u>.**

- ☐ Request refill of medications?
- ☐ Request correction of inaccurate information?
- ☐ Securely message healthcare provider and staff?
- ☐ Download your health information to your computer or mobile device, such as a cell phone or tablet?
- ☐ Add health information to share with your healthcare provider, such as health concerns, symptoms, and side effects?
- ☐ Help you make a decision about how to treat an illness or condition?
- ☐ Look up test results?
- ☐ Access educational materials (information pertaining to your disease, condition, age, etc.)
- ☐ Other, please specify ____

Page Break

Display This Question:

If In the last 12 months have you accessed your online medical record? = Yes

Q9 Which of the following types of medical information are included in your online medical records? One or more categories may be selected. **Mark <u>all that apply</u>.**

- ☐ List of health/medical problems
- ☐ Allergy list
- ☐ Clinical notes (healthcare provider's notes that describe a visit)
- ☐ Immunization or vaccination history
- ☐ Educational materials (information pertaining to your disease, condition, age, etc.)

Display This Question:

If In the last 12 months have you accessed your online medical record? = Yes

Q10 How difficult was it to understand the health information in your online medical record?

- ○ Very difficult
- ○ Difficult
- ○ Neutral
- ○ Easy
- ○ Very easy

Page Break

Display This Question:

If In the last 12 months have you accessed your online medical record? = Yes

Q11 In general, how useful is your online medical record for each of the following tasks?

	Very useful	Somewhat useful	Not very useful	Not at all useful	I do not use at all for this task
Request refill of medications	○	○	○	○	○
Request correction of inaccurate information	○	○	○	○	○
Securely message healthcare provider and staff	○	○	○	○	○
Download your health information to your computer or mobile device, such as a cell phone or tablet?	○	○	○	○	○
Add health information to share with your healthcare provider, such as health concerns, symptoms, and side effects	○	○	○	○	○

Start of Block: Demographics

Q12 What is your age in years?

- ○ 18 - 24
- ○ 25 - 34
- ○ 35 - 44
- ○ 45 - 54
- ○ 55 - 64
- ○ 65 - 74
- ○ 75 or older

Q13 What is your highest level of education?

- ○ 12th grade or less
- ○ High school diploma or equivalent
- ○ Some college, no degree
- ○ Associate's degree
- ○ Bachelor's degree
- ○ Post-graduate degree

Page Break

Q14 Are you Hispanic or Latino?

○ Yes

○ No

○ Prefer not to respond

Q15 What is your race? One or more categories may be selected. Mark all that apply.

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian or Other Pacific Islander

☐ White

☐ Prefer not to respond

Page Break

Q16 What is your sex?

○ Female

○ Male

○ Prefer not to say

Q17 What is your annual household income?

○ Under $20,000

○ $20,001 - $40,000

○ $40,001 - $60,000

○ $60,001 - $80,000

○ $80,001 - $100,000

○ $100,001 or over

Page Break

APPENDIX D Recruitment Letter

Dear Mississippi Resident:

My name is Anna Swann, and I am a doctoral candidate in the School of Leadership at The University of Southern Mississippi. I am conducting a research study as part of my Ph.D. degree in Instructional Technology and Design requirements. I want to invite you to participate in my research. Your participation would be greatly appreciated.

Patient portals (e.g., Hattiesburg Clinic's Iris) are secure websites through which patients may access select information found in their electronic medical records. The information available includes medications, discharge summaries, immunization records, and allergies. Patients may use the portals to message clinical staff, schedule appointments, refill prescriptions, and manage bills. In addition, patients can access the patient-specific education materials in the portals. Therefore, patient portals engage patients in their healthcare, improving health outcomes. However, only a small group of patients are utilizing patient portals. The purpose of this study is to investigate patient portal use among adults in Mississippi to understand barriers to patient portal use that they may encounter and the patient perceptions of portal use as well as the characteristics of users versus non-users.

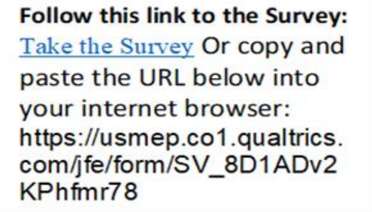
If you decide to participate in the study, you will be asked to complete a survey about online access to your medical records, as well as a series of demographic questions (age, race, etc.). The survey should take less than ten minutes to complete. Participation in this study is voluntary. If you do not feel comfortable answering some of the questions, you may stop at any time without penalty. Although you will not benefit directly from participating in this study, others in our community, in general, will benefit through further research or decisions based on the results of this research.

Results of the study may be published in professional journals or presented at conferences; however, your participation in this study will remain confidential. Names, email addresses, or other personal information will not be collected. All results will be kept anonymous.

If you have any questions concerning this study, don't hesitate to contact me by phone at (601) 266 – 4915 or email me at anna.swann@usm.edu. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5124, Hattiesburg, MS 39406-0001, 601-266-5997.

Thank you for your time and cooperation. By clicking the survey link below, you confirm that you have read this letter and agree to participate in this study.

Sincerely,
Anna K. Swann, M.S., MLS ASCP^{CM}
USM Department of Medical Laboratory Science
118 College Drive #5018
Hattiesburg, MS 39406 – 0001



Follow this link to the Survey:
Take the Survey Or copy and paste the URL below into your internet browser: https://usmep.co1.qualtrics.com/jfe/form/SV_8D1ADv2KPhfmr78

APPENDIX E Email Follow-up Recruitment Letter

Dear Mississippi Resident:

My name is Anna Swann, and I am a doctoral candidate in the School of Leadership at The University of Southern Mississippi. I am conducting a research study as part of my Ph.D. degree in Instructional Technology and Design requirements. Two weeks ago, you received the initial request to participate in my research. Thank you for your time if you completed the study survey; if not, your participation is still greatly appreciated.

Patient portals (e.g., Hattiesburg Clinic's Iris) are secure websites through which patients may access select information found in their electronic medical records. The information available includes medications, discharge summaries, immunization records, and allergies. Patients may use the portals to message clinical staff, schedule appointments, refill prescriptions, and manage bills. In addition, patients can access the patient-specific education materials in the portals. Therefore, patient portals engage patients in their healthcare, improving health outcomes. However, only a small group of patients are utilizing patient portals. The purpose of this study is to investigate patient portal use among adults in Mississippi to understand barriers to patient portal use that they may encounter and the patient perceptions of portal use, as well as the characteristics of users versus non-users. The findings of this research study will help to promote patient portal use and help improve the health of Mississippians.

If you decide to participate in the study, you will be asked to complete a survey about online access to your medical records, as well as a series of demographic questions (age, race, etc.). The survey should take less than ten minutes to complete. Participation in this study is voluntary. If you do not feel comfortable answering some of the questions, you may stop at any time without penalty. Although you will not benefit directly from participating in this study, others in our community, in general, will benefit through further research or decisions based on the results of this research.

Results of the study may be published in professional journals or presented at conferences; however, your participation in this study will remain confidential. Names, email addresses, or other personal information will not be collected. All results will be kept anonymous.

This study, protocol number 21-240, has been approved by 'USM's IRB. If you have any questions concerning this study, don't hesitate to contact me by phone at (601) 266 – 4915 or email me at anna.swann@usm.edu. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5124, Hattiesburg, MS 39406-0001, 601-266-5997.

Thank you for your time and cooperation. By clicking the survey link below, you confirm that you have read this letter and agree to participate in this study.

Sincerely,
Anna K. Swann, M.S., MLS ASCP^{CM}
USM Department of Medical Laboratory Science

Follow this link to the Survey:
Take the Survey Or copy and paste the URL below into your internet browser:
https://usmep.co1.qualtrics.com/jfe/form/SV_8D1ADv2KPhfmr78

APPENDIX F Recruitment Letter with QR code

Dear Mississippi Resident:

My name is Anna Swann, and I am a doctoral candidate in the School of Leadership at The University of Southern Mississippi. I am conducting a research study as part of my Ph.D. degree in Instructional Technology and Design requirements. I want to invite you to participate in my research. Your participation would be greatly appreciated.

Patient portals (e.g., Hattiesburg Clinic's Iris) are secure websites through which patients may access select information found in their electronic medical records. The information available includes medications, discharge summaries, immunization records, and allergies. Patients may use the portals to message clinical staff, schedule appointments, refill prescriptions, and manage bills. In addition, patients can access the patient-specific education materials in the portals. Therefore, patient portals engage patients in their healthcare, improving health outcomes. However, only a small group of patients are utilizing patient portals. The purpose of this study is to investigate patient portal use among adults in Mississippi to understand barriers to patient portal use that they may encounter and the patient perceptions of portal use as well as the characteristics of users versus non-users.

If you decide to participate in the study, you will be asked to complete a survey about online access to your medical records, as well as a series of demographic questions (age, race, etc.). The survey should take less than ten minutes to complete. Participation in this study is voluntary. If you do not feel comfortable answering some of the questions, you may stop at any time without penalty. Although you will not benefit directly from participating in this study, others in our community, in general, will benefit through further research or decisions based on the results of this research.

Results of the study may be published in professional journals or presented at conferences; however, your participation in this study will remain confidential. Names, email addresses, or other personal information will not be collected. All results will be kept anonymous.

If you have any questions concerning this study, don't hesitate to contact me by phone at (601) 266 – 4915 or email me at anna.swann@usm.edu. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5124, Hattiesburg, MS 39406-0001, 601-266-5997.

Thank you for your time and cooperation. By scanning the QR code below, you confirm that you have read this letter and agree to participate in this study.

Sincerely,
Anna K. Swann, M.S., MLS ASCP^{CM}
USM Department of Medical Laboratory Science
118 College Drive #5018
Hattiesburg, MS 39406 - 0001

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