Exploring Perceptions of Dermatology Access and the Adoption of Consultative Telederm Among Primary Care Providers in Rural Mississippi

Karen H. Dowling, D.H.A.

Submitted in partial fulfillment of the requirements for the degree of
Doctor of Health Administration

School of Health Related Professions
University of Mississippi Medical Center
Jackson, Mississippi

March 2020

This Doctoral Project by: Karen H. Dowling

Entitled. *Exploring Perceptions of Dermatology Access and the Adoption of Consultative Telederm Among Primary Care Providers in Rural Mississippi*

has been approved as meeting the requirement for the Degree of Doctor of Health Administration at the University of Mississippi Medical Center, School of Health Related Professions.

Accepted by the Advisory Committee:

Monte Luchlfing, D.H.A., Chairperson

Amber Arnold, D.N.P., R.N.

Robert Bladell, M.D.

Angela Darnell, Ph.D., R.N.

Alan Jones, M.D.

Accepted by the School of Health Related Professions

Jessica H. Bailey, Ph.D.
Dean, School of Health Related Professions

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

The following list provides abbreviations utilized throughout this document:

APP	Advanced Practice Provider
BCC	Basal cell carcinoma
CMS	Centers for Medicare and Medicaid Services
CNM	Certified Nurse Midwife
ECHO	Extension for Community Healthcare Outcomes
EHR	Electronic Health Record
FQHC	Federally Qualified Health Center
HMO	Health Maintenance Organization
HRSA	Health Resources and Services Administration
IRB	Institutional Review Board
FP	Family Physician
LI	Live-interactive
NASA	National Aeronautics and Space Administration
NMSC	Non-melanoma skin cancer
NP	Nurse Practitioner
PA	Physician Assistant
PCP	Primary Care Provider
RHC	Rural Health Clinic
SAF	Store-and-forward telederm
SCC	Squamous cell carcinoma
Telederm	Teledermatology
UMMC	University of Mississippi Medical Center
VA	Department of Veterans Affairs
VHA	Veterans Health Administration

Exploring Perceptions of Dermatology Access and the Adoption of Consultative Telederm Among Primary Care Providers in Rural Mississippi

Karen H. Dowling, D.H.A.
School of Health Related Professions
University of Mississippi Medical Center

March 2020

ABSTRACT

Store-and-forward (SAF) consultative telederm has been shown to be a flexible and effective platform for delivering specialized dermatology guidance related to the diagnosis and management of skin disorders. Store-and-forward telederm permits faster access to dermatology services and is linked to rapid access that creates face-to-face clinic availability for more complex cases that require in-person care. For states such as Mississippi with a limited number of dermatologists, developing provider resources for complex cases with potentially malignant skin disorders is critical. Although research regarding telehealth in general has shown high satisfaction rates among referring physicians and patients throughout the United States, primary care providers (PCPs) continue to demonstrate low adoption rates of consultative telederm. The purpose of this performance improvement project was to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi through personal, semi-structured interviews. Findings identified perceptions of considerable challenges to dermatology access for patients in rural Mississippi that have served to foster a self-reliance among rural PCPs when caring for dermatologic conditions. Participants expressed a general lack of awareness of telederm along with varying degrees of interest related to level of training and geographic location. Although perceived limitations to telederm exist along with misinformation about telehealth in general, there is a willingness among rural Mississippi PCPs to consider telederm as an option to increase dermatology access and avoid unnecessary travel for patients. These findings provide stakeholders key insights into perceptions among rural PCPs and recommendations for implementation that may best inform telederm process improvements and service offerings to meet the specific needs of PCPs practicing in rural Mississippi.

INTRODUCTION

CHAPTER I

INTRODUCTION

Teledermatology (telederm) has been recognized as a solution to improve access to care and decrease the time required for dermatology consultation and diagnosis (Kahn, Sossong, Goh, Carpenter, & Goldstein, 2013; Landow, Oh, & Weinstock, 2015; McFarland, Raugi, & Reiber, 2013). Early referral and accurate diagnosis of skin disorders is critical to positively impact clinical outcomes for patients (Kahn, et al., 2013). Although the value of telederm is widely recognized, primary care providers (PCPs) continue to demonstrate low adoption rates of consultative telederm in daily practice (Armstrong et al., 2012b; Moore et al., 2017).

Background and Significance

Telehealth is a growing industry with the potential of playing a significant role in meeting health care needs in the United States. Broadly defined, telehealth is remote health care delivery using technology (American Telemedicine Association, 2018). In 2013, the telehealth industry generated $9.6 billion in revenue, a growth of 60% over the previous year (Player, O'Bryan, Sederstrom, Pinckney, & Diaz, 2018). Approximately 25% of primary care visits result in a referral for specialty care (Barnett, Yee, Mehrotra, & Giboney, 2017). The limited number and maldistribution of specialists in the United States makes it difficult to meet the demand for these services (Dall et al., 2013). Telehealth offers a promising solution to expand delivery of specialty care. In 2018, over 160 telehealth bills were introduced in 44 states, demonstrating the acceptance and rapid growth of this platform (Shigekawa, Fix, Corbett, Roby, & Coffman, 2018).

Patients prefer receiving care locally, particularly older adults, a group strongly represented in rural communities. These patients often have challenges with travel and a desire or need for family to be involved. By utilizing telehealth options, the quality of care is improved in underserved areas where patients may not seek or receive care at all (Potter et al., 2016).

Despite these benefits and the increasing general acceptance of telederm, adoption of this technology remains low (Armstrong et al., 2012b; Kane & Gillis, 2018; Martin, Probst, Shah, Chen, & Garr, 2011; Yu, Mink, Huckfeldt, Gildemeister, & Abraham, 2018). In fact, it is estimated that only 15% of United States family physicians have

adopted any form of telehealth (Lin et al., 2018). The majority of specialty referrals in the United States continue to be made through traditional low-technology methods such as telephone and facsimile (Chen, Kushel, Grumbach, & Yee, 2010).

A number of barriers to adoption have been demonstrated in published studies. Most importantly, there is a negative attitude towards electronic health records (EHRs) and the perceived difficulties of using this technology. This influences the adoption of telehealth, because attitudes are often similar regarding EHRs and telehealth due to the practice of submitting eConsults through an established EHR (Mansouri-Rad, Mahmood, Thompson, & Putnam, 2013). In fact, family practice physicians with an EHR are more likely to use telehealth than those without an EHR (Moore et al., 2017). In addition, an incompatible EHR between the referring provider and specialist further reduces ease of use (Lin et al., 2018; Moore et al., 2017).

Several studies have identified a poor understanding of third-party reimbursement as a potential barrier to adoption of telehealth (Armstrong et al., 2012b; Martin et al., 2011; Moore et al., 2017). In addition, providers' perceptions and concerns related to medical malpractice liability are cited as common barriers to adoption (Armstrong et al., 2012b; Barbieri, Nelson, Bream, & Kovarik, 2015; Moore et al., 2017). Finally, rural providers are challenged by technical issues related to high-speed internet, impacting their willingness to adopt telehealth (Lin et al., 2018).

What is Telederm?

Telederm is the use of telehealth specifically to address skin disorders (Armstrong, Kwong, Ledo, Nesbitt, & Shewry, 2011). Dermatology is a well-suited specialty for this visually driven modality. It was first piloted by the Veterans Health Administration (VHA) in the late 1990s (Landow et al., 2015). According to a 2017 survey conducted by Yim, Florek, Oh, McKoy, & Armstrong (2018), the VHA continued to be the largest provider of telederm with 62 consultation sites and over 100,000 telederm consults annually. Surveyors identified 40 active nongovernmental telederm programs, primarily in academic medical centers, representing a 48% increase over the previous five years (Yim, Florek, Oh, McKoy, & Armstrong, 2018).

Current telederm strategies have moved beyond attempting to reach those in rural areas to improving access to dermatologic care for everyone with a promise of quicker

and more cost-effective care (Landow, Mateus, Korgavkar, Nightingale, & Weinstock, 2014). Although advantages of telederm are widely recognized, there remain well-documented limitations to adoption, preventing this powerful platform from reaching its full potential.

Telederm process and delivery models. As outlined by Pathipati, Lee, and Armstrong (2011), there are three primary approaches to using telederm: consultative, triage and direct care. The consultative model is the most common and involves the primary care provider (PCP) utilizing telederm to gain expert diagnostic and management guidance from a trained dermatologist. In a telederm consultative visit, also known as an eConsult, a release-of-information form is signed, and the referring provider submits a photographic image of the skin condition or lesion through an electronic platform to a trained dermatologist for review and guidance. In consultative telederm, the PCP maintains overall treatment responsibility for the patient using diagnostic and management guidance from the dermatologist (Anderson et al., 2018). In University of Mississippi Medical Center's (UMMC) consultative telederm workflow, the referring provider submits necessary information through its EHR, *Epic*. If the referring provider is external to UMMC, the workflow involves using UMMC's portal for outside care providers known as *Epic Care Link*, branded by UMMC as *UView*.

The triage model is used internally by a dermatology practice to better identify critical access needs of patients in the community who are waiting for a face-to-face visit. It is utilized to determine if the patient should be seen more quickly than the next available appointment, and if a telederm visit may suffice as a viable alternative to a face-to-face visit in some cases (Pathipati, Lee, & Armstrong, 2011).

Lastly, the direct-care model allows patients to access the dermatologist directly from home through telederm applications. The direct-care model is not yet widely used, but future applications may be useful for low-complexity conditions such as acne, saving valuable in-clinic resources and availability for patients with complicated and potentially more serious skin disorders (Pathipati et al., 2011).

Modes of transmission. There are two primary modes of transmission for telederm. First, live-interactive (LI) telederm is a method in which the referring provider and patient interact in real-time with a remote dermatologist through video conferencing.

Secondly, store-and-forward (SAF) telederm is an asynchronous process in which images are captured and submitted securely through a specialized application for review and consultation by a dermatologist (Anderson et al., 2018; Whited et al., 2013).

The flexibility of SAF telederm reduces the time for a completed telederm consult versus a face-to-face clinic visit, thereby reducing time to diagnosis and treatment (Kahn et al., 2013; Landow et al., 2015; McFarland et al., 2013). Programs with SAF telederm are also able to better utilize physician resources and improve access to care. For these reasons, it is by far the more prevalent mode of transmission. Store-and-forward telederm is practiced in 81% of United States telederm programs, a significant shift from LI which was most prevalent in the early 2000s (Armstrong et al., 2012b). In a 2016 survey of active telederm programs in the United States, SAF continued to be the most common mode of transmission (Yim et al., 2018).

Landow, Oh, and Weinstock (2015) provided an overview of standardized VHA data utilizing both LI and SAF modes of transmission in their telederm program. Researchers analyzed national data from an internal database capturing telehealth use among VHA's 1,700 clinics and 152 medical centers. Trends revealed that urban telederm encounters outpaced those in rural VHA sites beginning in 2012. The VHA telederm program requires a 7-day completion from time of referral from all participating sites and is rigorous in its training protocols and policies known as *Conditions of Participation*. Researchers noted a significant decrease in wait times for a dermatology appointment for patients within the VHA as well as an increase in SAF care delivery over LI because of its time efficiency and flexibility for providers (Landow et al., 2015).

Teledermoscopy. Dermatologists are better at detecting skin cancer than PCPs (Cook, Palmer, & Shuler, 2015; Stratton & Loescher, 2016). Dermoscopy is being incorporated by some telederm programs as a tool that can aid PCPs in better identification and triaging of skin lesions (Cook, Palmer, & Shuler, 2015; Naka et al., 2018; Stratton & Loescher, 2016). Teledermoscopy involves providing the PCP with dermatoscope capability to magnify and augment views of the skin lesion to provide enhanced images. Teledermoscopy can be performed with a handheld dermatoscope or through a mobile phone attachment and software application (Stratton & Loescher, 2016). Including teledermoscopy when possible has been demonstrated to be an effective

adjunct to telederm when addressing potential skin cancers (Warshaw, Gravely, & Nelson, 2015).

Why is Teledermatology Important?

Workforce challenges. By 2025, the demand for adult primary care services is expected to increase by 14% and dermatology visits are anticipated to increase by 16% (Dall et al., 2013). Considering that 1 in 8 primary care visits are related to skin disorders, the ability to use telederm to extend primary care management of such disorders with expert dermatologic diagnostic and treatment guidance will be critical to delivering a service that is already resource constrained (Coates, Kvedar, & Granstein, 2015).

Glazer and Rigel (2017) analyzed membership and geographical data available from national professional dermatology associations to assess dermatology-to-population ratios and identify trends in dermatology workforce density and geographic distribution. There are currently 3.4 dermatologists per 100,000 people in the dermatology workforce which falls below the recommended metric of four dermatologists per 100,000 people. In addition, Glazer and Rigel (2017) noted that the number of dermatology training programs is not projected to grow, further adding to the shortage.

Further impacting this metric is the fact that most dermatologists are clustered in urban areas with many rural counties left with no local dermatologists (Glazer & Rigel, 2017). Geographic clusters show a scarcity of dermatologists in the Mississippi Delta, a rural and underserved area of the state. According to the Association of American Medical Colleges (2015), Mississippi, a state with 82 counties, has 60 active practicing dermatologists with 35% of those being age 60 or older, indicating an aging workforce that may further impact future shortages.

The workforce shortage and access issues are exacerbated for children, with national wait times for an appointment averaging 54 days (Dall et al., 2013). There are only 226 board-certified pediatric dermatologists in the United States, with 15 states lacking a single board-certified pediatric dermatologist, including Mississippi (Fogel & Teng, 2015b).

Although the demand for dermatology services is anticipated to grow, the number of training programs is expected to remain stagnant. This combined with an aging

workforce and clustering of specialists within urban settings will continue to impact supply, particularly in rural areas. With average national wait times for a dermatology appointment in excess of one month and even higher actual wait times depending on location, technology offers a possible alternative to improve this situation (Glazer & Rigel, 2017).

Skin cancer in the United States. More than one million skin cancers are diagnosed each year in the United States with 1 in 5 Americans being diagnosed with skin cancer during their lifetime (Viola et al., 2011). Skin cancer is the fifth most costly malignancy to treat in the United States (Rogers, Weinstock, Feldman, & Coldiron, 2015), and the incidence is increasing with an economic burden of $8.1 billion annually (Guy, Machlin, Ekwueme, & Yabroff, 2015). There are three commonly known types of skin cancer: basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and melanoma (Oliveria, Heneghan, Cushman, Ughetta, & Halpern, 2011). Melanoma is the least common, but the most likely skin cancer to result in fatalities, accounting for 75% of all skin cancer related deaths. Risk of death from melanoma is directly related to the stage of disease progression at time of diagnosis (Cook et al., 2015). According to recent statistics, an estimated 650 new cases of melanoma will be diagnosed in Mississippi annually, with the majority of individuals diagnosed being older, white males (American Cancer Society, 2019). With early detection and treatment, almost all skin cancers can be successfully managed. Primary care providers are the first to screen and intervene with the ability to detect and treat skin cancer early for improved prognosis (Cook et al., 2015).

Skin Cancer and Rural Populations

Rural populations tend to be older, less educated, more likely to be smokers and live in poverty with decreased access to reliable transportation (Weaver, Geiger, Lu, & Case, 2012; Zahnd, Goldfarb, Scaife, & Francis, 2010). These characteristics are important to note because they mimic demographics of those at higher risk for skin cancer: older, male, smoker, unmarried, and less educated. In fact, this demographic is not only more likely to have skin cancer, but more likely to be first diagnosed with late-stage skin cancer (Zahnd et al., 2010).

There has been a noted increase in health disparity between urban and rural populations over the past several decades with higher cancer mortality among the 21% of Americans living in rural areas (Weaver et al., 2012; Zhang et al., 2018). Data have also shown an increasing gap between urban and rural life expectancy over the past several decades. The gap increased from 0.4 years shorter life expectancy for rural residents in 1971 to 2.0 years in 2009 (Singh & Siahpush, 2014).

It is widely recognized that rural populations have limited access to health care, with particular challenges accessing specialty care (Anderson et al., 2018; Caldwell, Ford, Wallace, Wang, & Takahashi, 2016; Martin et al., 2011). In addition to accessing local health care providers, rural populations also often face difficulty with transportation, a barrier in which telehealth can provide a solution (Caldwell et al., 2016; Martin et al., 2011; Weaver et al., 2012). Because individuals living in rural areas have less access to health care, they tend to have fewer opportunities for early skin cancer screening and detection, making it more common for advanced skin cancer at time of diagnosis. Delayed initiation of treatment has been shown to negatively influence prognosis (Cook et al., 2015; Zahnd et al., 2010).

Rural Health Clinics (RHCs) are certified through Centers for Medicare and Medicaid Services (CMS) and are intended to provide primary care services to underserved populations (National Association of Rural Health Clinics, n.d.). With 185 RHCs certified in Mississippi (Mississippi State Department of Health, 2018), this network of clinics provides another important vehicle for introducing telederm to rural PCPs as an option to increase access for their patients.

Reimbursement of Telederm

Reimbursement is often noted as one of the most significant barriers to use of telederm in the United States (Mayer, 2015). State policy varies significantly, however LI telederm has historically been reimbursed more favorably than SAF telederm, with some states limiting reimbursement to LI telederm only. As of 2016, only 11 states, including Mississippi, reimbursed for SAF telederm (Campagna, Naka, & Lu, 2017).

Telederm at University of Mississippi Medical Center

University of Mississippi Medical Center (UMMC) is well poised to meet PCPs' dermatology consult needs through telederm. University of Mississippi Medical Center

is one of only two academic medical centers in the United States recognized as a National Telehealth Center of Excellence by Health Resources and Services Administration (University of Mississippi Medical Center, 2017). In addition, Mississippi has benefitted from some of the most favorable telehealth legislation in the nation, specifically a parity law, which establishes equal reimbursement for telehealth visits as face-to-face clinic visits. Insurance plans must also cover telehealth services to the same extent as services delivered face-to-face (Mississippi Telehealth Association, n.d.).

Statement of the Problem

Consultative telederm has been validated as an instrumental tool in improving access to care and triaging patient consults necessary for face-to-face clinic visits and procedures. For states such as Mississippi with a limited number of dermatologists, utilizing provider resources for complex patient cases with potentially malignant skin disorders is critical. Although research regarding telehealth in general has shown high satisfaction rates among referring physicians and patients throughout the United States, PCPs continue to demonstrate low adoption rates of consultative telederm (Armstrong et al., 2012b).

Purpose of the Investigation

The purpose of this performance improvement project was to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi through personal, semi-structured interviews. By gaining insight into perceived barriers to adoption of telederm, health care administrators can refine processes to help UMMC meet its mission to deliver care to all Mississippians by improving access to rural populations.

Questions to be Answered

This investigation addresses perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi with the goal of increasing patient access to specialty services and timeliness of diagnosis. The investigation design is a qualitative exploration of perceptions and attitudes among PCPs practicing in rural Mississippi. By conducting personal interviews, the investigator intended to answer the following questions:

1. What are rural Mississippi primary care providers' perceptions of consultative telederm?
2. What are the perceptions of rural primary care providers regarding consultative telederm who are routinely utilizing it in practice?
3. What are the perceptions of rural primary care providers regarding consultative telederm who have not routinely adopted it in practice?

Definition of Key Terms

The following definitions are provided to ensure broad understanding of these terms throughout the investigation.

Advanced Practice Provider (APP) A clinical professional that is not a physician but has advanced training and a licensure level that allows a certain level of treatment authority, such as prescribing of medications. Includes nurse practitioners and physician assistants (Morris, 2016).

Asynchronous store-and forward (SAF) A telehealth and telederm delivery method that utilizes digital photographic images stored and forwarded for review by a physician at a later time (Landow et al., 2015).

Benign For the purpose of skin lesions, the term benign is used to describe non-cancerous disorders (National Institutes of Health, n.d.).

eConsult Term used to refer to electronic consultations involving secure, asynchronous exchanges of clinical information between a primary care provider and a specialist. The consultative delivery model of telederm can be referenced as an eConsult visit (Anderson et al., 2018).

Face-to-face visits Traditional in-person clinic visits (Landow et al., 2014).

Malignant For the purpose of skin lesions, the term malignant is used to describe cancerous disorders (National Institutes of Health, n.d.).

Melanoma The most rare and fatal form of skin cancer (National Institutes of Health, n.d.).

Non-Melanoma Skin Cancer (NMSC) Skin cancers other than melanoma, including Basal Cell Carcinoma and Squamous Cell Carcinoma (Rogers et al., 2015).

Primary Care Provider (PCP) A provider trained in family practice, internal medicine or pediatrics that is responsible for providing care and engaging specialists for comprehensive care of the patient (American Academy of Family Physicians, 2019).

Provider For the purpose of this study, the term provider is used to reference physicians and advanced practice providers encompassing nurse practitioners and physician assistants.

Rural Mississippi Includes Mississippi counties that have a population less than 50,000 individuals; an area that is less than 500 individuals per square mile; or a municipality of less than 15,000 individuals (Mississippi Rural Health Association, 2017).

Rural Health Clinic (RHC) The Rural Health Clinic program is designed to encourage and stabilize the provision of outpatient primary care in underserved rural areas through the use of physicians, physician assistants (PAs), nurse practitioners (NPs), and certified nurse midwives (CNMs). Rural Health Clinic designation is obtained through Centers for Medicare and Medicaid Services (CMS) by meeting criteria intended to obtain the aforementioned objectives (National Association of Rural Health Clinics, n.d.).

Skin Lesion A broad term used to describe physical changes in the skin considered to be caused directly by a disease process (Williams & Katcher, 2003)

Synchronous Live-interactive telehealth (LI) Real-time or live-interactive video conferencing to support and provide health services from a distance (Nelson et al., 2016).

Teledermatology (telederm) The practice of delivering dermatology services via technology (Armstrong et al., 2011).

Teledermoscopy The practice of using a digital dermatoscope or dermoscopy attachment with magnification and polarized light to capture a more detailed image of the skin lesion (Lee, Finnane, & Soyer, 2018).

Telehealth Although some define telehealth to be broader than telemedicine, the American Telemedicine Association (2018) treats “telehealth” and “telemedicine” synonymously.

Telemedicine Broadly defined as using technology to provide and support health care at a distance (Coates et al., 2015).

Veterans Health Administration (VHA) One of three distinct administrations within the Department of Veterans Affairs (VA). The VHA is the United States' largest integrated health care system (U.S. Department of Veterans Affairs, 2018). For the purpose of this study, VHA will be used to reference all entities and activities related to VA and VHA unless specifically noted.

Possible Application of Findings

If perceptions of rural PCPs regarding the use of consultative telederm are better understood, it is hoped that elimination of perceived barriers to adoption will improve access to dermatologic care for rural populations in Mississippi. By eliminating barriers, health care administrators can improve access to care, thus promoting a key mission of UMMC to provide needed specialty care to all Mississippians.

Summary

The need for access to dermatology care and the delays in receiving these services provides an impetus to incorporate telederm into rural medical practices in an effort to improve timely access to dermatologic care. This investigation explores perceptions of rural PCPs so that health care administrators can develop processes that result in increased rates of adoption of telederm. With increased adoption, the telederm platform may lead to improved access to care for rural populations and efficient utilization of limited specialty physician resources.

REVIEW OF THE LITERATURE

CHAPTER II

REVIEW OF THE LITERATURE

Successful implementation and adoption of telehealth is a mechanism to increase access to timely consultation and diagnosis from workforce-constrained specialties such as dermatology. In this literature review, the history and evolution of telehealth and its applicability to dermatology is provided along with clinical outcomes, limitations, provider and patient perceptions, and an overview of reimbursement as it relates to adoption. Although telehealth is a modality used worldwide to increase access to care in remote areas, this literature review is limited to United States studies because of the country's unique health care system, reimbursement, and workforce challenges. This literature review is organized into eight main themes. These primary themes and their related literature will be presented in the order shown in Figure 1.

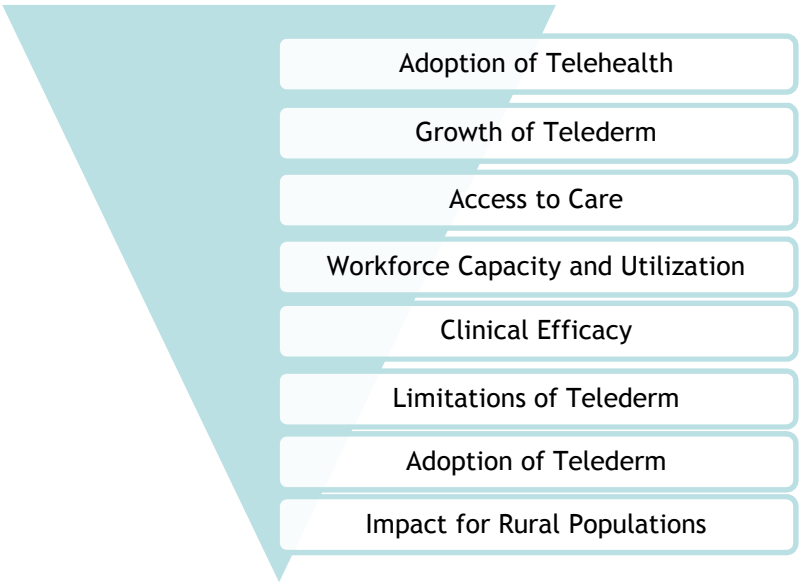

Figure 1. This figure illustrates the flow of the literature review.

Telehealth Overview

Telehealth is defined as using technology to support and provide health care remotely. Telehealth can be traced back to the early 1900s when ship captains used radio transmittal to convey and receive medical guidance. National Aeronautics and Space Administration (NASA) later used telehealth to monitor astronauts' vital signs from

space, and the United States military has used telehealth to provide specialized care to those deployed (Coates et al., 2015). The VHA has aggressively employed telehealth in the past two decades to fulfill its promise to provide health care to every enrolled veteran living in the United States within 40 miles of his or her home. The VHA has been a leading pioneer of telehealth because of the VHA's federal status and the fact that state licensure and medical malpractice restrictions are not applicable to physicians and patients within the VHA system (Landow et al., 2015).

Adoption of Telehealth

Although the promise of telehealth is widely accepted, the adoption of this technology remains low. According to claims data from Centers for Medicare and Medicaid Services (CMS), less than 1% of Medicare beneficiaries received care via telehealth in 2014 compared to 12% of patients covered by Department of Veterans Affairs (VA) benefits (Kane & Gillis, 2018). In a study conducted by Moore et al. (2017), researchers developed and administered a survey to investigate use of telehealth and barriers to use among family physicians (FPs). A questionnaire consisting of 30 questions focused on physician and practice characteristics, use in practice, barriers, and attitudes toward telehealth was mailed to a random sample of 5,000 FPs in the United States with active membership in the American Academy of Family Physicians. In order to ensure strong representation from rural FPs, rural FPs were oversampled at a rate of 2 to 1. Of the 5,000 solicited, 1,630 FPs responded. Results indicated that 15% of FPs who were sampled had used telehealth in the previous year with greater use being represented among those practicing in a rural area, part of a group practice, and operating with an EHR. Of those FPs reporting use of telehealth, 84% noted at least one barrier to adoption, with lack of training and concerns regarding reimbursement being cited as most frequent barriers (Moore et al., 2017).

Multiple factors related to practice setting and geographic location have been found to influence the rate of adoption of telehealth. Lin et al. (2018) assessed the adoption of telehealth in federally-funded health centers with a particular interest in how rural settings differed from urban health centers and to determine if the quality infrastructure and Medicaid reimbursement policies impacted use of telehealth. Annual, standardized data from health systems including all national Health Resources and

Services Administration (HRSA) funded health centers was obtained from the national Uniform Data System. The 2016 Uniform Data System data set was the first to include questions regarding use of telehealth and perceived barriers to adoption. Telehealth systems were utilized by 38% of HRSA-funded health centers with almost half using it to provide mental health services. Researchers found that almost half of all 1,367 HRSA-funded health centers in the United States were located in rural areas and were 10% more likely to use telehealth than urban centers, with an even greater likelihood of using this technology for mental health (Lin et al., 2018).

State policies and funding have also been noted as a factor in adoption of telehealth. Park, Erikson, Han, and Iyer (2018) surveyed four years of data from a national consumer survey commissioned by the Association of American Medical Colleges to assess trends in telehealth usage and the role state policies play in adoption. Researchers found evidence of overall increased use, particularly among Medicare beneficiaries younger than 65 years of age and those with limited mobility. Underserved populations, including those in rural areas receiving Medicaid benefits, were found to have significantly lower use of telehealth. Researchers also noted that in 2018, CMS released proposed rules for 2019 to promote adoption of telehealth regardless of urban or rural setting, leading the way on policy efforts to increase use of this technology (Park, Erikson, Han, & Iyer, 2018).

Access to specialty care has been shown to improve with the use of telehealth, particularly with underserved populations in safety-net health systems. Barnett, Yee, Mehrotra, and Giboney (2017) conducted a study on the impact of a consultative telehealth program on access to specialty visits in a Los Angeles safety-net system. The Los Angeles County Department of Health Services, the second largest public health system in the United States, launched its consultative telehealth or eConsult program in 2012. The initiative was instituted as a result of PCPs routinely directing patients to the emergency room due to frustration over long wait times for specialty appointments. Researchers conducted a retrospective, observational study using an internal database of all eConsult referrals from 2012-2015. Researchers analyzed data to assess time interval from date of eConsult specialty referral to date of completion. Four years after the program's inception, results indicated that the median response interval to an eConsult

referral was less than one day. Twenty-five percent of referrals were resolved via telehealth without requiring a face-to-face specialty clinic visit (Barnett et al., 2017).

Growth of Telederm

Telederm is a specific specialty use of telehealth and continues to grow in the United States. Yim, Oh, McKoy, and Armstrong (2018) conducted a survey of telederm programs in the United States that were active between November 2014 and January 2017. Researchers modified a questionnaire used in their 2011 survey and distributed to programs that were previously surveyed as well as new programs identified through the American Telemedicine Association Telederm Special Interest Group. Ninety-two questionnaires were sent to programs identified as potentially active. Because of its scope and standardized approach, the VHA was considered as one combined program. Results indicated a 48% increase in growth of non-governmental telederm programs in the five years since previously surveyed. Of active programs, 50% were found to be at academic medical centers. Thirty percent of active programs surveyed in 2011 had been discontinued by the time of the updated survey. Survey results indicated that 72% of active programs utilized SAF telederm as its sole mode of transmission. The largest provider of telederm continued to be the VHA with 62 consultation sites and a total of 101,507 telederm consultations performed in fiscal year 2016 (Yim et al., 2018).

This increase in telederm use, in part, is the result of improvements in mobile phone technology which allows users to take photos with higher quality, display, and resolution than just a few years ago. These improvements, combined with more advanced software applications, are contributing to increased accessibility and growth of telederm in the United States (Clark, Bosanac, Ho, & Sivamani, 2018). In addition, with more than 75% of the world's population having access to a mobile phone and widespread availability of internet access, telederm is an affordable option to increase access across the globe (Coates et al., 2015).

Impact of Telederm

Access to Care

Nationally, the average wait time for a dermatology appointment is 33.9 days. Wait time is much higher in rural areas where there are fewer dermatologists. Wait time is also much higher than the national average in academic medical centers and safety-net

hospitals, which care for uninsured and underinsured patients (Glazer & Rigel, 2017). A number of studies have demonstrated a decrease in wait time for dermatology appointments as a significant advantage of SAF telederm (Kahn et al., 2013; Landow et al., 2015; McFarland et al., 2013). Kahn, Sossong, Goh, Carpenter, and Goldstein (2013) conducted a retrospective, observational study using data from a Kaiser Permanente Northern California dermatology clinic to compare the wait time from initial PCP visit to biopsy of suspicious skin lesion between face-to-face clinic referrals and consultative telederm referrals. The study targeted 293 patients meeting study criteria that were eventually diagnosed with one of the three most common forms of skin cancer: BCC, SCC, and melanoma. Of the study population, 58% were seen through traditional face-to-face dermatology referrals, and 42% received care through referrals to the consultative telederm program. Patients referred to dermatology through the telederm program had a statistically significant decreased wait time to biopsy, a mean of 9.7 days, compared to those receiving dermatologic care through traditional face-to-face clinic visits with a mean of 13.8 days, indicating that telederm could provide decreased wait time for identification and biopsy of malignant skin lesions (Kahn et al., 2013).

Although the VHA, an early adopter and leading pioneer in telederm, requires a 7-day turnaround as a requirement for participation (Landow et al., 2015), at least one study has indicated a much lower turnaround time at 1.7 days (McFarland et al., 2013). In a study investigating PCP satisfaction of telederm in rural VHA clinics, McFarland, Raugi, and Reiber (2013) analyzed data related to 16,194 telederm consults completed between October 2009 and June 2012 across 30 rural VHA sites in the Pacific Northwest states of Alaska, Idaho, Oregon, and Washington. Researchers administered a satisfaction survey to 21 referring PCPs and found that providers were most satisfied with the timeliness of telederm consults as reflected by a decreased wait time to diagnosis and treatment (McFarland et al., 2013).

It has been observed within the VHA system, that the incorporation of telederm can increase access to dermatology care overall. Raugi et al. (2016) extracted data from the VHA Corporate Data Warehouse for both telederm and face-to-face dermatology consults originating from the VHA Medical Center in Spokane, Washington between January 1, 2012 and June 30, 2013. The first six-month period was considered a baseline

period followed by implementation starting July 1, 2012 when two PCPs were trained to perform basic dermatology procedures as an adjunct to the dermatologists on staff. Results showed that within six months of implementation, the combined number of telederm and face-to-face dermatology referrals increased by 40%. Over the implementation period, the number of telederm referrals increased, while referrals for face-to-face care decreased. Improved access was noted for both telederm and face-to-face visits with a combined decrease in days from time of referral to completion from 61.2 days to 10.3 days (Raugi et al., 2016).

Workforce Capacity and Utilization

The flexibility offered by SAF telederm has the potential to utilize scarce dermatology resources in a far better fashion than other options. Long wait times to access dermatology, particularly in underserved areas, are well documented. The long wait times for dermatology appointments are associated with higher rates of missed patient appointments. A group of researchers from Wake Forest Baptist Health in Winston-Salem, North Carolina studied missed dermatology clinic appointments from May 1, 2013 to April 30, 2014. Of the time period studied, 19.4% of appointments within the dermatology clinic were missed. Out of 799 patients contacted by telephone, 38% responded to the survey. Thirty-five percent of respondents indicated that they had forgotten about the appointment, indicating time interval between referral and appointment as a factor in missed appointments. Other patient-reported factors included lack of transportation, long travel distances, and insurance coverage (Moustafa, Ramsey, Huang, & Huang, 2015).

Similarly, Cronin, Decoste, and Kimball (2013) conducted a multivariate analysis of missed dermatology appointments at the Massachusetts General Hospital between August 2010 and July 2011. During that timeframe, 18.6% of patient appointments were missed. Results of the analysis were consistent with research correlating higher rates of missed appointments with time interval between referral and scheduled appointment date (Cronin, Decoste, & Kimball, 2013). Because of revenue generated by dermatology procedures, each missed appointment can result in up to $200 in lost revenue (Moustafa et al., 2015).

The flexibility of SAF telederm offers other advantages. Dermatologists are able to complete SAF telederm consults waiting in the queue outside of traditional clinic hours or when a patient does not arrive for a face-to-face clinic visit. This allows better utilization of physicians' time, which is critical for academic medical centers such as UMMC serving as a safety-net hospital for the entire state.

Clinical Efficacy of Telederm

The reliability and validity of telederm versus face-to-face clinic appointments has been well studied. Whited et al. (2013) conducted a randomized, controlled trial investigating differences in clinical management between SAF telederm and traditional face-to-face clinic visits. Patients were recruited from two VHA dermatology clinics, one in Columbia, Missouri and one in Minneapolis, Minnesota. Informed consent was obtained, and 392 patients were enrolled between 2008 and 2011. Patients were randomized to traditional face-to-face treatment or telederm. Telederm consults utilized standardized digital imaging protocols. Results demonstrated no significant difference in the course of treatment or clinical outcome between face-to-face dermatology visits and telederm (Whited et al., 2013).

Diagnostic Accuracy

Warshaw et al. (2011) systematically reviewed 78 studies to assess the reliability of SAF telederm for diagnosis and management of skin disorders. Researchers found that in 10 out of 15 previous studies, the diagnostic accuracy of face-to-face clinic dermatology was shown to be better than telederm; however, three studies showed better diagnostic accuracy for skin disorders utilizing telederm. Telederm was found to be less accurate than face-to-face care for diagnosing BCC, SCC, and melanoma; however, time to treatment and biopsy was significantly shorter with telederm. Conclusive diagnosis and treatment were noted to be 50 days utilizing telederm compared to 138 days utilizing traditional face-to-face clinic dermatology (Warshaw et al., 2011).

Warshaw, Gravely, and Nelson (2015) conducted a cross-sectional repeated measures study to determine agreement of diagnosis and management of skin lesions among clinic dermatologists and teledermatologists. Participants included 2,152 patients being treated for a skin lesion within the Minneapolis VHA Medical Center dermatology clinic. A sequence of up to three images was taken by research assistants using different

cameras and sent via SAF platform to an experienced teledermatologist for consultation. A separate panel of board-certified dermatologists served as secondary reviewers. There was moderate agreement for primary diagnosis and fair agreement for the management plan. The association between the teledermatologists' rated image quality and confidence level was statistically significant (Warshaw et al., 2015).

A similar study using mobile phones was conducted by Lamel et al. (2012) in Sacramento, California specifically investigating the diagnostic and management agreement between face-to-face dermatology care and SAF telederm. Participants included 86 volunteers who presented to a skin cancer screening event and were allowed to designate three areas to be imaged for screening. Researchers captured images using a mobile phone enabled with a software application designed to capture images and forward telederm consults to dermatologists. A total of 137 skin lesions were imaged over the course of the event. One dermatologist completed face-to-face screenings at the event while another dermatologist who was blinded to the face-to-face recommendations, completed the screening via telederm. Results indicated that diagnostic agreement of SAF telederm performed with a mobile phone was equivalent to traditional SAF telederm completed with a digital camera. Management agreement was noted to be high at 81% between face-to-face examinations and those completed through SAF telederm via a mobile phone. Study results indicate that mobile phone technology is, therefore, a convenient and practical method for skin cancer screening in the absence of a dermatologist (Lamel et al., 2012).

Concerns have been raised regarding telederm for diagnosis and management of melanoma. Wang et al. (2017) conducted a retrospective study involving chart review of 7,960 veterans in the Pacific Northwest receiving care for a suspicious lesion via SAF telederm between July 1, 2009 and December 31, 2011. For study inclusion, the suspicious lesion imaged must have been followed by a pathologic diagnosis of melanoma within one year of the first telederm consult. Sixty-one melanomas were confirmed during the observation period with teledermatologists correctly diagnosing 74% and correctly managing 93%. Diagnosis of melanoma with telederm was correct 68.6% of the time without dermoscopy and 100% of the time with dermoscopy,

indicating the benefit of teledermoscopy as an adjunct to SAF telederm (Wang et al., 2017).

Little research has been conducted to assess the positive predictive value or true positive results among cases identified as possible melanoma by SAF telederm. Gemelas, Capulong, Lau, Mata-Diaz, and Raugi (2019) reviewed 8,706 telederm consults of veterans within the Pacific Northwest VHA system between February 1, 2015 and January 31, 2016. Positive predictive value was analyzed overall and by individual telederm provider. Results indicated that 13.7% of possible melanomas identified by telederm were confirmed as melanoma, a positive predictive value that is in-line with face-to-face screenings. There was significant variation noted among providers and quality of images was noted to be associated with higher rates of correct diagnoses. Researchers determined that diagnostic accuracy of telederm for identifying melanoma was comparable to face-to-face dermatology care and that methods to improve imaging should be a priority (Gemelas, Capulong, Lau, Mata-Diaz, & Raugi, 2019).

An additional area of study is the use of telederm compared to face-to-face dermatology in the identification and diagnosis of skin cancer among individuals with a higher risk for skin cancer. Creighton-Smith et al. (2017) conducted a retrospective cohort study comparing all new SAF telederm visits and a subset of randomly selected face-to-face dermatology visits at VHA Boston Healthcare System in 2014. The incidence of identified skin cancer, both adjusted and unadjusted for risk factors, was compared between the two cohorts. Participants included 434 patients in the SAF telederm cohort and 587 patients randomized to the face-to-face cohort. A significantly higher number of biopsies were performed in the face-to-face cohort (27.2%) when compared to the telederm cohort (11.5%); however, the number of malignant skin lesions confirmed through biopsy was nearly equal at 43.8% for face-to-face care and 50% for those first identified through telederm. Similar time intervals from identification to biopsy were noted in both cohorts. Researchers found that patients with previous history of skin cancer and elevated risk factors were more likely to be evaluated face-to-face. Furthermore, a family history of skin cancer was the highest predictor of melanoma diagnosis. When adjusted for differences in risk factors, identification of skin cancer through telederm and face-to-face methods was comparable. Researchers concluded that

SAF telederm is an appropriate tool for skin cancer detection among patients with low-risk profiles and without a history of skin cancer (Creighton-Smith et al., 2017).

Few studies have investigated the accuracy of diagnosis and management information received via telederm compared to care received from PCPs without the guidance of an expert dermatologist. Nelson et al. (2016) conducted this type of prospective study in 11 of Philadelphia's urban, underserved primary care clinics. Researchers investigated agreement of diagnosis and management of skin disorders between PCPs and dermatologists consulting through the *AccessDerm* SAF telederm mobile platform. Primary care providers were instructed to submit consults that they believed would benefit from dermatology guidance. As part of the submission, PCPs were required to state their diagnosis and treatment plan in the absence of dermatology input. Teledermatologists also provided a differential diagnosis and treatment plan. A total of 225 telederm consults were submitted by 30 PCPs and reviewed by nine board-certified dermatologists. Results showed a high level of disagreement between PCPs and dermatologists on both diagnostic and clinical management metrics. Results also indicated a 14-hour turnaround for completion of telederm consults with 77% of the consults being resolved through telederm and not requiring a face-to-face clinic visit. This improved both timeliness and access to care (Nelson et al., 2016). These results indicate that although some studies (Warshaw et al., 2011) have shown that telederm may not outperform face-to-face dermatology clinic visits when studied in isolation, telederm may far outweigh PCP diagnosis and management for skin disorders.

Avoidance of Face-to-Face Visits

One of the most important metrics to judge the success of telederm programs is the number of unnecessary face-to-face visits avoided, thereby opening up clinic spots for more complex and urgent cases. Veterans Health Administration, the largest telederm program in the United States, reports being able to avoid face-to-face clinic visits using telederm 50% of the time (Landow et al., 2014). In a literature review of 27 studies focused on telederm, Landow, Mateus, Korgavkar, Nightingale, and Weinstock (2014) found that appropriate triaging and selection of patients for telederm, as well as high-quality photo images, positively impacted overall ability to avoid face-to-face clinic visits. Training and established guidelines, particularly the trained skill of taking high-

quality photographic images and the competence that comes from frequent use, were found to be the most important in decreasing the need for face-to-face visits. This is important because to truly ease wait time and extend dermatology provider capacity, a significant number of telederm consults should result in full resolution rather than requiring follow-up face-to-face visits (Landow et al., 2014).

The inclusion of dermoscopy has been found to decrease the number of face-to-face dermatology visits required by the dermatology team. Naka et al. (2018) conducted a descriptive retrospective cohort study of 2,385 dermatology referrals from PCPs at Community Health Center, a large multi-site Federally Qualified Health Center in Connecticut between June 2014 and November 2015. The two comparison groups included participants referred in the six months prior to telederm eConsult implementation and those referred in the six months following implementation of the program. The post-implementation cohort was further subdivided into two cohorts; those referred to telederm and those referred for face-to-face visits. The telederm eConsult program involved participating PCPs receiving digital cameras and dermatoscopes at a combined value of $310 and standardized training around photo capture with the dermatoscope. The average telederm eConsult time to completion was less than 24 hours and subsequent face-to-face visits if deemed necessary were completed within a median of 28 days. In comparison, face-to-face referrals had a median of 104 days for completion. Results showed that 84% of telederm eConsults prevented a face-to-face visit, the highest rate published in literature to date. Researchers indicated that the robust and standardized training along with high quality images were critical factors to achieving the high rate of face-to-face visits avoided. Researchers noted that although access was improved and satisfaction among PCPs was high at 85%, less than half of all dermatology referrals were sent as telederm eConsults, indicating significant room for growth in adoption (Naka et al., 2018).

Limitations of Telederm

While there are a number of positive benefits of SAF telederm, there are also some limitations. These include the inability to obtain a full-interactive medical history from the patient and the inability to conduct a full-body examination. In a retrospective cohort study conducted within the VHA Connecticut Healthcare System, Viola et al.

(2011) evaluated clinical outcomes of 400 patient referrals to dermatology and noted that the majority of melanomas in the study were missed by referring PCPs. Often when a patient is referred by a PCP for a face-to-face dermatology consult for a suspicious lesion, a lesion on another area of the body is identified and diagnosed as cancerous. Researchers found that half of skin cancers identified were incidental to the lesion in which the PCP referred the patient, and 10% of those incidental lesions identified were melanoma (Viola et al., 2011).

The topic of incidental lesions and the identification of melanoma have been more recently studied by Gendreau et al. (2017). Researchers conducted a retrospective review of all SAF telederm referrals within VHA Pacific Northwest from July 1, 2009 to December 31, 2011. During that timeframe, 12,863 SAF telederm consultations were completed on 7,960 veterans. Of the 69 melanomas that resulted from this population, 56 were imaged and included with the telederm referral, while 13 were missed and not imaged. Melanomas missed were found to be non-invasive or thinner, indicating a need for PCPs to be educated on recognizing more subtle melanomas (Gendreau et al., 2017).

A study assessing referrals received from PCPs to board-certified pediatric dermatologists showed that 36% were initially misdiagnosed or mismanaged by the PCP (Fogel, & Teng, 2015a). These results indicate a need for more appropriate triaging in which telederm can play a role.

Another limitation of consultative telederm is the inability to ensure adherence by PCPs of dermatology care recommendations. Bertrand, Weinstock, and Landow (2019) conducted a retrospective chart review of 460 telederm consults completed at Providence VHA Medical Center and associated outpatient sites in Rhode Island and Massachusetts between June and August of 2016. All telederm consults were completed within one week and 51% were able to avoid face-to-face visits. Dermatologists completing the telederm consults recommended the PCP prescribe medication for 193 patients. Records showed that 69% had medications prescribed by the PCP within seven days. Only 45% of patients who were recommended to receive communication or treatment by the PCP had been contacted within seven days. Of the 249 patients that were recommended to receive follow-up from their PCP, only 32% had any recorded documentation showing attempt at follow-up. Researchers note that for full implementation of telederm, PCP

acceptance of recommendations and participation in the care plan is critical (Bertrand, Weinstock, & Landow, 2019). Because of these limitations, SAF telederm may be best used for low-complexity issues such as skin rashes that with appropriate guidance, can be managed by the PCP (Warshaw et al., 2015).

Factors Impacting Adoption of Telederm

Reimbursement

In many states, including Mississippi, the reimbursement of telederm visits are the same as face-to-face visits (Thomas & Capistrant, 2017). There is a perception among providers that telederm visits are reimbursed at lower rates, likely driven by the lack of procedures such as biopsy and cryotherapy, which increase reimbursement for a face-to-face clinic visit (Armstrong et al., 2011). Although this difference does exist, by utilizing telederm for lower complexity visits, more clinic slots are available for higher complexity, procedure-driven visits which have the potential to increase overall revenue. In a 2011 survey of active telederm programs throughout the United States, Armstrong et al. (2012) found that the most frequent payer for telederm services was private commercial payers followed by self-pay, Medicaid, Medicare, and Health Maintenance Organizations (HMOs). With recent efforts driven by CMS and state policy to encourage adoption of telehealth (Park et al., 2018), government payers such as Medicare and Medicaid should experience future increases in utilization of telederm services.

Perceptions and Satisfaction

A number of studies have been conducted to assess perceptions and satisfaction of telederm among referring providers (Armstrong et al., 2012a; Barbieri et al., 2015; McFarland et al., 2013), dermatologists providing care (Armstrong et al., 2012b), and patients receiving care via telederm services (McFarland et al., 2013). McFarland, Raugi, and Reiber (2013) conducted a satisfaction survey of referring PCPs, imaging technicians, and rural patients impacted by a consultative telederm program at 30 rural VHA outpatient clinics. Nearly 71% of the 21 PCPs that completed the survey reported satisfaction with the program. Those practicing in high volume clinics noted higher satisfaction, up to 91%. The average time for a telederm consult to be completed was 1.7 days and the quick turnaround was noted as the highest satisfaction aspect, rated at 81%.

Researchers had previously noted patient satisfaction to be 77%, indicating high satisfaction among both referring PCPs and patients (McFarland et al., 2013).

In a qualitative study involving personal interviews with 10 PCPs who routinely referred patients via telederm through California's Specialty Care Safety Net Initiative, Armstrong et al. (2012a) found that 100% of PCPs interviewed reported that improving access and timeliness to care was the primary reason they utilized telederm. The PCPs also responded that in order to improve access for their patients, 90% of them welcomed the added responsibility of communicating diagnoses and recommended treatment plans to patients (Armstrong et al., 2012a).

Another key benefit PCPs have reported is an educational aspect in which telederm increases knowledge of skin disorders over time and changes referral patterns, appropriately triaging cases that truly need face-to-face clinic visits (Armstrong et al., 2012a; Barbieri et al., 2015). Mohan, Molina, and Stavert (2018) conducted a study at Beth Israel Deaconess Medical Center investigating the impact of a new consultative SAF telederm program on referring PCPs. Researchers specifically targeted the impact of the program on acquisition of knowledge and confidence in relation to providing dermatologic care. Eighteen PCPs completed the survey prior to the implementation of the program and then again 12 months later. Seven PCPs reported that they felt confident in diagnosing and managing patients' conditions at the end of 12 months compared to three PCPs reporting confidence prior to the start of the program. Those PCPs that referred 12 or more patients over the course of the year reported higher gains in knowledge and confidence. Study results indicate that consultative telederm improves PCP knowledge and ability to manage skin disorders through the experience and education that comes with frequent utilization (Mohan, Molina, & Stavert, 2018).

A study was recently completed comparing patient and provider satisfaction of dermatology care delivered through three modes: face-to-face visits, SAF telederm, or LI telederm. Marchell et al. (2017) conducted a quasi-randomized controlled trial with 210 patients evaluated three times; once face-to-face, once through LI video conferencing and once via SAF telederm. Patients and providers rated the encounter on a 5-point Likert scale following each encounter. All dermatologists rated face-to-face as the preferred mode citing the ability to touch the patient and the flexibility of the face-to-face

evaluation as the primary reasons. Patients also preferred face-to-face evaluations; however, 14% of patients reported that they preferred telederm methods, whether SAF or LI (Marchell et al., 2017).

Fewer studies have assessed dermatologists' perceptions and satisfaction with SAF telederm as a health care delivery option. From September 2010 to March 2011, Armstrong et al. (2012b) randomly surveyed board-certified dermatologists in California who were not practicing telederm. Of 120 dermatologists surveyed, 21 responded. Researchers found two primary reasons that dermatologists chose not to practice telederm: concerns over reimbursement and medical malpractice risks. With greater education regarding the benefit to patients and operationally to the practice, more dermatologists may be open to offering SAF telederm as an adjunct to traditional practice (Armstrong et al., 2012b).

There is very little data to assess why PCPs with access to SAF consultative telederm, choose not to adopt the practice. Barbieri et al. (2015) anonymously surveyed 30 PCPs practicing in urban clinics on their perceptions of mobile-based SAF telederm. Of 18 respondents, all recognized value in telederm and expressed minimal concerns over medical liability and privacy, most likely due to the secure platform. Similar studies do not exist exploring rural PCP perceptions and barriers. This is a gap in research, particularly when exploring the perceptions and attitudes of PCPs in rural Mississippi. Research is needed to understand why these PCPs have not adopted SAF consultative telederm, even though access to dermatology services is limited in their communities.

Potential Impact for Rural Populations

Although telederm has been embraced as a mechanism to improve access to dermatologic care for all, its roots in improving access to care for rural patients is still relevant. The demographic profile of populations with higher skin cancer diagnoses in the United States share similar characteristics as rural populations: older, less educated, smokers, and underinsured (Zahnd et al., 2010). A recent study conducted by Cunningham, Yu, and Shete (2019) comparing sun protection behaviors across urban and rural populations in Texas revealed results consistent with earlier research noting decreased sun protection behaviors among rural residents. This finding was based on answers from a 153-question Texas health screening survey administered between

February 5 and March 5, 2018. A nonprobability sample of 2,050 Texas residents with 60% residing in urban areas and 40% residing in rural areas showed rural residents to be less likely to seek shade if exposed to sun more than one hour and less likely to wear sunscreen (Cunningham, Yu, & Shete, 2019).

Weaver et al. (2012) conducted a cross-sectional study of data from 2006-2010 National Health Information Survey information and found that rural cancer survivors continue to exhibit poor health behaviors and poor self-reported health status. In 2011, 75% of patients receiving telederm services in California, a state with robust telehealth practices, tended to live in rural areas and had incomes that fell below 200% of the federal poverty level (Coates et al., 2015). Considering Mississippi's high rural population and lack of access to dermatologists in rural geographic regions, SAF telederm could improve access for rural populations and help UMMC meet its mission to deliver care to all Mississippians.

Conclusion

Store-and-forward consultative telederm has been shown to be a flexible and effective platform for delivering specialized dermatology guidance related to the diagnosis and management of skin disorders. Store-and-forward telederm permits faster access to dermatology services and creates face-to-face clinic availability for more complex cases that require in-person care. Thus, SAF telederm provides a mechanism for better utilizing scarce dermatology resources. Despite the recognized benefits of telederm, adoption rates among PCPs remain low (Armstrong, 2012b, Moore et al., 2017). University of Mississippi Medical Center's SAF telederm program is poised and ready to increase access for patients throughout Mississippi, particularly those in rural and underserved areas such as the Mississippi Delta. This investigation explores perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi.

INVESTIGATION

CHAPTER III
INVESTIGATION

It is widely recognized that access to dermatologic care, particularly in rural areas, is challenged by an inadequate supply of dermatologists to meet the demand for these services. Three trends were seen in the literature. First, demand for dermatology services is anticipated to grow while the supply of dermatologists is anticipated to remain stagnant (Dall et al., 2013; Glazer & Rigel, 2017). Secondly, telederm is a clinically viable platform to increase access to dermatology expertise and better utilize scarce physician resources, particularly for rural areas (Kahn et al., 2013; Landow et al., 2014; Landow et al., 2015; McFarland et al., 2013). Lastly, although the value of consultative telederm is widely recognized, adoption in daily practice among PCPs remains low (Armstrong et al. 2012b; Moore et al., 2017).

Purpose and Description of the Investigation

The purpose of this performance improvement project was to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi through personal, semi-structured interviews. Consultative telederm is a valuable tool to increase access to expert dermatology care for those in rural and underserved areas, as well as decrease wait time for diagnosis and treatment of suspicious skin lesions (Kahn et al., 2013; McFarland et al., 2013). By identifying perceptions and barriers to adoption, solutions can be developed to increase use of telederm to better serve rural populations.

Questions to be Answered

By conducting personal, semi-structured interviews, the author's intent was to answer the following questions:

1. What are rural primary care providers' perceptions of consultative telederm?
2. What are the perceptions of rural primary care providers regarding consultative telederm who are routinely utilizing it in practice?
3. What are the perceptions of rural primary care providers regarding consultative telederm who have not routinely adopted it in practice?

Investigation Design

This performance improvement project was designed using an individual, semi-structured interview approach to explore perceptions regarding dermatology access and adoption of telederm among PCPs in rural Mississippi. The author's intent to gain a better understanding of perceptions regarding dermatology access and adoption of telederm created a strong rationale for a qualitative approach (Creswell & Creswell, 2018). The design reflects a grounded theory approach because of the investigator's intent to develop theory grounded in data from participants sharing experiences and perceptions (Creswell & Poth, 2018). All targeted participants share a common experience for developing grounded theory in that they all treat patients that need dermatology services and all have the ability and option of utilizing telederm to better meet those needs.

Setting

The investigation was conducted through personal, semi-structured interviews via telephone. The investigator intended whenever possible to conduct interviews in the natural setting of PCP clinical practices, however all participants opted to participate by telephone. Primary care providers targeted for participation were those with practice experience in geographical areas of Mississippi designated as rural. Rural is defined by the Mississippi State Department of Health in Rule 1.3.1 as a Mississippi county that has a population less than 50,000 individuals; an area that is less than 500 individuals per square mile; or a municipality of less than 15,000 individuals (Mississippi Rural Health Association, 2017).

Participants

The targeted population included PCPs in rural Mississippi. For the purpose of this investigation, the term PCP refers to a physician or advanced practice provider (APP) serving as a PCP trained in family practice, internal medicine, or pediatrics that is responsible for engaging specialists and providing comprehensive care of the patient (American Academy of Family Physicians, 2019). A purposive sampling approach was initially used to identify the most information-rich participants based on maximum variation of sample (Palinkas et al., 2013). The investigator targeted participants from every region of the state of Mississippi to maximize regional variation. This approach

was intended to yield a variety of participants who could provide unique perspectives and information. The following criteria further guided sample selection:

- PCPs practicing in designated RHCs
- Rural PCPs who may have been unaware of telederm offerings
- Rural PCPs who may have been aware of telederm offerings but not yet adopted
- Rural PCPs who previously utilized UMMC's consultative telederm program

To aid participant sample identification, a list of designated RHCs with contact information was obtained from publicly available rosters provided by the Mississippi State Department of Health. As an investigator performing a performance improvement project, a series of information and data requests were made to UMMC department leadership with authority to release relevant data. A list of rural PCPs with historical referrals to UMMC's telederm program, along with frequency of referrals, was included in the data obtained from UMMC departmental leadership.

Recruitment

Rural PCPs were contacted and invited to participate via letters, telephone calls, and electronic communication efforts (see Appendix A). As acknowledgement of rural PCPs' patient care demands and heavy clinical workload, a broad timeframe was allowed for scheduling and completing interviews. All participants were given the option of scheduling an interview in their office or by telephone. All participants elected to participate via telephone. Over 225 invitations were distributed via letter, email, and telephone methods. Letters were mailed to designated RHCs as well as rural practices recommended by UMMC's Office of Physician Relations and Chair of Family Practice. Follow-up phone calls were made to clinic office managers for assistance. In addition, newsletter and social media announcements were made by partner organizations such as Mississippi Hospital Association and Mississippi Rural Health Association. The Chief Medical Officer of a rural Mississippi hospital with a network of rural clinics sent an email to all medical staff encouraging participation along with a copy of the investigation details. This effort resulted in one email response outlining negative thoughts and perceptions of telehealth in general. This individual did not respond to additional email and telephone contact requesting a personal interview to further discuss.

In addition to purposive sampling based on above mentioned methods and criteria, the investigator also solicited recommendations from participants as to other PCPs who may have had knowledge and perceptions to share with relevance to the topic of investigation. This technique of snowball sampling further contributed to the emergent design of the study and was critical to gaining interviews due to minimal response from initial efforts (Valerio et al., 2016).

Interviews were conducted until the data reached saturation of themes, and no new insights or novel information emerged (Corbin & Strauss, 2015). As the interviews progressed and analysis began, the investigator sought additional interviews with participants who were best able to form the emerging theory to saturation (Creswell & Poth, 2018). A total of 21 semi-structured interviews were completed as part of this investigation.

Interview Procedure

Interviews were voluntary and semi-structured with an interview guide of open-ended and probing questions intended to elicit in-depth insights into perceptions of dermatology access and barriers within daily practice that impact adoption of consultative telederm. Information about the investigation and assurances of confidentiality were shared with each participant prior to initiation of the interview. Consent to participate and allow audio-recording of the interview (see Appendix B) with written or verbal acknowledgement of understanding was obtained from each participant prior to initiation of interview.

Instrument Tool

The investigator utilized an interview guide (see Appendix C) in order to preserve consistency of topics and concepts covered in each interview (Corbin & Strauss, 2015). Questions included in the interview guide were primarily open-ended and probing to elicit broad responses related to the topic of inquiry. Initial questions were asked regarding training background, length of time in practice, exposure to telehealth, and average number of patients seen in a day to gain a broad understanding of participant practice demographics. Meticulous development of an interview guide contributes to the reliability and trustworthiness of the study design and process. The interview guide

should allow for flexibility and improvisation through probing to reflect a true emergent design (Kallio, Pietilä, Johnson, & Kangasniemi, 2016).

As part of interview guide development, questions were assessed to validate alignment with overarching investigation questions and purpose. Any unnecessary questions or questions not related to purpose were eliminated to maintain focus (Castillo-Montoya, 2016).

Three pilot interview and feedback sessions were conducted with volunteer participants from UMMC clinical departments of Family Medicine, Internal Medicine, and Pediatrics to solicit feedback and revise questions accordingly. Testing the interview guide with practice participants can lead to the refinement and development of more relevant questions by determining whether they indeed elicit perceptions and experiences (Kallio et al., 2016). Responses from the pilot testers were not included as part of the data collection and were only intended to increase rigor and trustworthiness of the interview process. Modifications were made to the flow of questions as organized in the interview guide and a question regarding the consultative aspect of SAF telederm as it relates to medication prescribing comfort was added as a result of feedback from the pilot testers.

Data Collection and Analysis

Interviews were audio-recorded digitally with the permission of the participants and immediately transcribed to text using Temi software application. Temi is an advanced speech recognition software adopted by the journalism industry that transcribes audio-recordings to text (Temi, 2019). Text was transcribed following the interview as a formal complement to field notes informally captured during the interview process.

In addition, the investigator listened to transcripts immediately following the interview and recorded reflexive notes and memos to capture observations and nuances of the interview not captured via audio-recordings. Early analytic writing through memos and coding as the data are collected is a hallmark of grounded theory methodology and provides focus to the process (Charmaz, 2014). Audio-recordings have been stored in a password-protected file accessible only to the investigator and will be deleted by June 1, 2020. Transcriptions of the interviews have been stored in a password-protected file and

will be maintained for six years according to institutional policy prior to being permanently deleted.

Data were analyzed using a grounded theory approach involving immersion/crystallization. This approach involves the investigator being immersed in the data until themes emerge and crystallize (Ferrante, Cohen, & Crosson, 2010). After each interview, the investigator immediately converted audio-recordings to transcription. Temi assures data encryption and secured servers for data protection to maintain credibility and confidentiality of participants (Temi, 2019). Transcriptions of interviews were reviewed multiple times and hand-coded by the investigator to identify common themes and then further reduced into subthemes and associations.

As part of a grounded theory approach, three levels of coding were employed during analysis. During open coding, the investigator reviewed data to determine initial categories based on themes. In subsequent axial coding, the investigator further segmented information to determine relationships between themes and categories through deductive reasoning (Creswell & Poth, 2018). Axial coding provides a strategy for taking the data that have been broken down during open coding and bringing the pieces back together in new ways to create a broader concept (Charmaz, 2014). Finally, the investigator engaged in the process of selective coding to synthesize data and categories to construct grounded theory (Creswell & Poth, 2018). The investigator simultaneously collected and analyzed data over the course of interviews by employing a constant comparison method to build theory (Foley & Timonen, 2014). The investigator also journaled throughout the investigation to document steps and record key process milestones and emerging themes.

Trustworthiness

A peer coder was utilized to review the investigator's data analysis to ensure all themes were identified and to assist in eliminating investigator bias. The peer coder was chosen based on the individual's knowledge and understanding of qualitative investigation processes rather than exposure to telederm to lend credibility and trustworthiness to the data analysis process while minimizing bias. The peer coder reviewed five transcripts which were randomly chosen using a random number generator.

Once review was complete, the peer coder and investigator consulted and discussed analyses to ensure agreement regarding the emerging themes and subthemes.

The investigator also utilized member checking to minimize bias and promote credibility. Once themes were identified and agreed upon through the peer coding process, the investigator emailed a summary of concepts and themes emerging from the semi-structured interview process to 17 interview participants who had provided email contact information. This process provided participants an opportunity to review and validate themes.

Ethical Considerations

Institutional Review Board

The investigator completed the Human Research Self-Certification Form (see Appendix D) and utilized the decision charts provided by the United States Department of Health and Human Services Office for Human Research Protection (2016) to determine that this performance improvement project did not require full Institutional Review Board (IRB) review. Because this investigation met the definition of quality assurance/improvement and does not intend to add to generalizable knowledge, the proposal did not need to be reviewed by the IRB because it does not meet criteria for human subject research.

Confidentiality

Participants voluntarily participated in interviews and provided either written or verbal consent to participate. To preserve positive relationships among rural PCPs and UMMC staff and dermatologists, responses are confidential to maintain anonymity, and data are password-protected with access limited to the investigator. Confidentiality and anonymity have been maintained by omitting personal identifying information and only identifying participants as a physician or APP when sharing results. The investigator will maintain interview transcripts in a password-protected file for a minimum of six years and will dispose of information according to institutional policy.

Timeline

The time from initial solicitation of participants to data analysis and reporting of results was anticipated to extend six months and was completed within five months. The

initial project phase was aimed at recruiting participants, setting interview schedules, and conducting interviews.

- October 23, 2019 – December 17, 2019
    - Refined interview guide based on volunteer pilot participant feedback (October 23, 2019 – November 3, 2019)
    - Participant recruitment and identification of sample participants; scheduled interviews (November 4, 2019 – December 17, 2019)
    - Conducted participant interviews and transcribed responses (November 8, 2019 – December 17, 2019)

The remainder of the project timeline focused on data analysis and synthesis.

- December 18, 2019 – March 16, 2020
    - Completed thematic analysis (December 18, 2019- January 31, 2020)
    - Completed manuscript (February 26, 2020)
    - Oral presentation/defense (March 16, 2020)

Resources

Committee chair, committee members, clinical chairs of departments of dermatology, family practice, and pediatrics, as well as staff and leadership of UMMC's Center for Telehealth, physician relations and department of information security were critical to the success of this performance improvement project. Other groups that provided support include Mississippi Hospital Association and the Mississippi Rural Health Association. Equipment and software used for the study included an iPhone XR, a laptop, Microsoft Word, Excel, and Outlook, digital recording device and Temi software application for transcription, as well as access to One Drive for cloud-based document storage.

Conclusion

This performance improvement project was designed to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi. Personal, semi-structured interviews were conducted with 21 PCPs using an interview guide to facilitate discussion on key concepts related to the investigation's purpose. Results of the investigation will be shared with key stakeholders including the

chair, administration, and faculty of the Department of Dermatology as well as the Center for Telehealth at UMMC.

SOLUTION

CHAPTER IV
SOLUTION

Overview

The purpose of this performance improvement project was to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi. This performance improvement project aimed to answer the following questions:

1. What are rural primary care providers' perceptions of consultative telederm?
2. What are the perceptions of rural primary care providers regarding consultative telederm who are routinely utilizing it in practice?
3. What are the perceptions of rural primary care providers regarding consultative telederm who have not routinely adopted it in practice?

To obtain the answers to these questions, the investigator conducted personal, semi-structured interviews with PCPs representing a variety of rural Mississippi regions, training, and educational backgrounds, as well as length of time in clinical practice. This chapter discusses results of qualitative data collected and analyzed following 21 interviews. As a result of the investigation, six primary themes were identified with several accompanying subthemes.

Procedure and Participants

Following three pilot interview and feedback sessions with local providers conducted in October 2019, more than 225 invitations to participate in interviews for this investigation were distributed via letter, email, and telephone contact. Letters were mailed to all Mississippi designated RHCs with emails and telephone calls made strategically to further prompt response. Because of poor initial response, several groups, including the Mississippi Rural Health Association and the Mississippi Hospital Association agreed to share invitation information in newsletters and social media posts. Invitations to participate were also extended to rural PCPs as a result of recommendations from volunteer participants. Over the course of six weeks, a total of 21 interviews were conducted via telephone. Interviews were conducted until the data reached saturation of themes and no new insights emerged. One email was received in response to a social

media announcement and outlined the provider's negative perceptions of telehealth in general. Three attempts made by the investigator to follow-up with an interview as part of the investigation were not acknowledged. Although this feedback was not included in formal data collection and analysis, it was used to further inform certain emerging themes.

A purposive sample consisting of rural PCPs throughout Mississippi was invited to participate in order to achieve a maximum variation of participants. Of the 21 participants interviewed, 43% were family practice or internal medicine physicians, 38% were APPs and 19% were pediatric physicians. Experience ranged from less than one year in practice to 26 years in practice with the average being 9.5 years. Participants reported a wide range of clinical activity from an average of eight patients seen per clinic day to 40 patients seen per day with a group average of 23 patients seen per day. Of the 21 participants, 52% reported previous telehealth use and all but one participant reported current use of an EHR. A majority of participants (76 %) were trained at UMMC and a total of four participants reported use of UMMC's telederm program, either since in practice or while in training as a resident at UMMC. Participants represented a variety of rural Mississippi regions as noted in Figure 2.

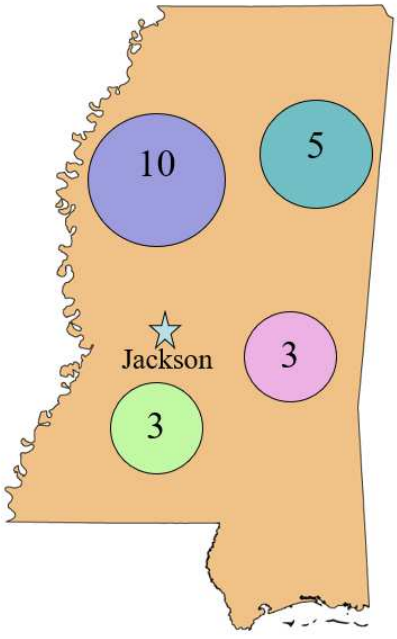

Figure 2. This figure illustrates participant geographic distribution throughout Mississippi.

With consent from each participant, interviews were audio-recorded and immediately transcribed to text following the interview using Temi software application. An interview guide consisting of practice demographic questions followed by a series of open-ended questions was used to prompt conversation regarding perceptions of dermatology access and adoption of consultative telederm (see Appendix C). The length of interview ranged from eight minutes to nearly 21 minutes, with the average interview lasting 13 minutes.

Data Analysis

Following each interview and throughout the interview process, the investigator simultaneously collected and analyzed data utilizing the constant comparison method and was immersed in the data until themes emerged. A process of qualitative coding was employed as noted in Figure 3 to arrive at six primary themes. A peer coder experienced in qualitative analysis was utilized as well as the application of a member checking process to ensure trustworthiness.

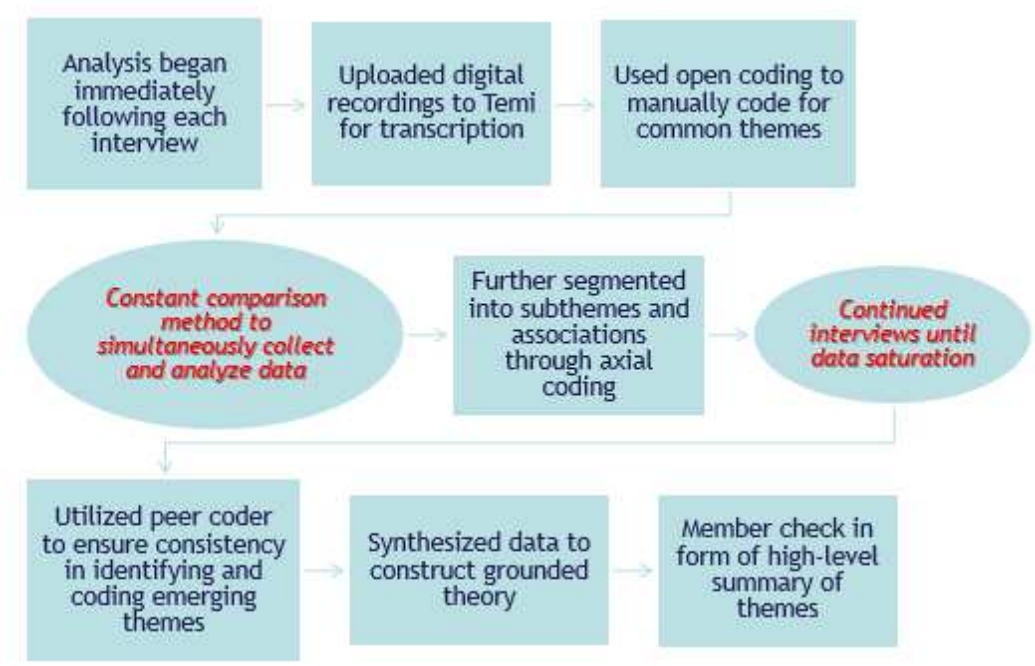

Figure 3. This figure illustrates the qualitative analysis process involved in this investigation.

Findings

This section includes discussion of emergent themes from qualitative analysis. Relevant quotations are provided throughout the chapter to further support the emergent themes. To preserve participant anonymity, quotes have notation as to clinical training background only. Table 1 provides an overview of themes and subthemes.

Table 1: Overview of themes from data analysis.

Themes	Subthemes
Challenges Leading to Self-reliance	• Trial and error • Informal channels • UMMC as the safety-net ▪ Primary destination for self-pay and Medicaid
Exposure and Demand	
Perceived Value	• Impact on workflow • Consultative aspect ▪ Continuity of care • Patient satisfaction
Perceived Liability	• Impact on workflow • Consultative aspect
Misguided Assumptions	
Looking Back and Moving Forward	• Live-interactive • Technology ▪ Photo quality

The findings are presented in a combined response to the three initial investigation questions as it became evident throughout qualitative data collection and analysis that the three questions are interwoven and cannot be disentangled from the unity of results that provide insight into the perceptions of rural Mississippi PCPs regarding dermatology access and consultative telederm. Figure 4 represents the model of theory grounded in data based on participant perceptions and shared experiences.

Figure 4. This figure illustrates the model of grounded theory.

Discussion of Themes

Theme 1: Challenges Leading to Self-reliance

Perceived barriers to dermatology access for patients have led to a self-reliance among rural Mississippi PCPs. The investigator inquired about perceptions of access to dermatology services as a precursor to exploring perceptions of telederm as a solution to any existing access challenges. A number of perceived barriers to dermatology access for patients were noted by PCP participants with payer source being referenced as the most significant barrier. "If you don't have insurance, it's near about impossible" (Physician participant). Another significant challenge for patients as perceived by rural PCPs is transportation followed by availability and financial constraints. Although these barriers to access for patients are perceptions of rural PCPs and not directly communicated by

patients, all challenges noted, particularly payer source and transportation, are well supported by the literature (Anderson et al., 2018; Caldwell et al., 2016; Martin et al., 2011).

> "Sometimes we'll have to try multiple dermatology offices before we can get them in" (APP participant).

> "For our patients, if they have transportation, it's maybe not a safe mode of transportation, so long distances are something they can't do or are not willing to do" (APP participant).

> "There's still a hesitancy to travel in the elderly population that I see. And even in other populations, especially in a poor population, transportation is a big deal" (Physician participant).

> "Even in an area like Jackson, it was sometimes difficult to get people in and then you try and throw in our [rural] population into the Jackson pool because of payer source issues or because of availability issues, and that just makes the availability even more difficult" (Physician participant).

A number of physicians, particularly with a background in family practice, noted a high comfort level diagnosing and managing dermatologic conditions. Training to care for such conditions, along with barriers to dermatology access for patients, has led to a self-reliance among some rural PCPs when caring for dermatologic conditions and a hesitancy to refer for routine dermatology needs because of access challenges.

> "I typically try to do a lot of the derm stuff myself" (Physician participant).

> "A lot of times we'll just go ahead and biopsy it ourselves" (Physician participant).

> "A lot of times when you end up trying to send patients somewhere you end up spending more time on the phone trying to arrange it than you do actually seeing the patient" (Physician participant).

> "Most of the stuff that we see are things that we've been trained to take care of" (Physician participant).

> "I make the referral be the last thing that I do. Cause you know, we have these derm books and I try to treat as best as I can. If I get to the point where I've tried to do as much as I can, like punch biopsies, skin tag removals, and all those things on my own, then I'll just send out" (Physician participant).

> "To be quite honest, a lot of times I would not refer and would try something myself to see if it would get better before I would refer because of the intrinsic delays" (Physician participant).

Subtheme: Trial and error. The described self-reliance reportedly results in a trial and error approach to management of dermatologic conditions with a number of participants noting the inefficiency of such an approach. This is supported by literature which indicates telehealth consults result in quicker initiation of an appropriate treatment plan, thereby reducing costly mismanagement and complications (Anderson et al., 2018).

> "Regarding waiting for consultation report…sometimes the waiting is just as efficient as therapy that may not have worked" (Physician participant).

> "Sometimes you see a rash and you're like, hey look, I think this is what it is. I'm not 100% certain, but it's a lot of gas money and everything for you to load up and get to Jackson, so let's do this and have you come back and then if it's still not better go from there" (APP participant).

> "I feel like a lot of our derm related issues end up being trial and error. We treat it like we really think it is, have them come back and if it's not better then got to turn the wheels again and figure something else out" (APP participant).

Subtheme: Informal channels. In addition to self-reliance, some participants described informal channels of support for dermatologic conditions that have evolved as a result of access challenges, including texting of photos and telephone assistance.

> "We have a group text and we'll text about different patients that may come in and kind of, what do you think about this or what do you think about that? The derm stuff is just so hard to describe. It's almost like you need to be able to see it. So when the patient says 'yes, that's fine, you can send them a picture of my leg', then, you know, we try to say, okay, where would you go from here" (APP participant).

> "I've sent pictures to physicians and I've sent videos to physicians…some dermatologists. So in that sense I've used telehealth but nothing probably in the form that you're inquiring about" (Physician participant).

> "Sometimes we'll make a phone call and kind of get an idea from the dermatologist, but you know, sometimes they won't be able to be seen because of insurance issues" (Physician participant).

Subtheme: UMMC as the safety-net. Participants repeatedly indicated that local dermatology access is incredibly challenging for uninsured, self-pay patients or for patients with Medicaid as a payer source; a patient population frequently served by designated RHCs. Challenges to accessing specialty care among the uninsured, particularly in rural areas, is consistent with national findings (Anderson et al., 2018; Barnett et al., 2017). Reportedly, most private dermatologists serving rural Mississippi patients accept commercial insurance only, leaving UMMC's dermatology program to serve as the state's safety-net for uninsured and Medicaid patients requiring dermatologic specialty care.

> "If it's a Medicaid patient, of course we have to refer them to UMMC" (APP participant).
>
> "Most uninsured have to get approved through the patient assistance program through UMMC. And then face the trouble of having to get to Jackson" (APP participant).
>
> "And generally, the appointments are harder to get into, certainly in Jackson. And of course, it's really just strictly limited to the university [UMMC] cause a number of the private ones don't take Medicaid either that I know of" (Physician participant).
>
> "I do use UMMC a lot for my self-pay patients. You know that with a self-pay patient, that's where they're going and they're never going somewhere else" (APP participant).

Theme 2: Exposure and Demand

In general, rural PCPs are unaware of telederm as an option and have various degrees of interest based on training, experience, and geographic location. In an effort to guide purposive participant sampling to answer the question as to the perceptions of rural PCPs regarding consultative telederm who are routinely utilizing it in practice, telederm referral data for the time period of January 1, 2018 to May 31, 2019 were obtained from UMMC's Center for Telehealth. Only 15 rural Mississippi PCPs were noted to have referred to telederm in the time period and none were considered frequent utilizers. One provider had utilized the service three instances and the majority had only utilized the service once. All 15 providers were invited to participate in this investigation. Three

agreed to an interview, one of whom was unable to recall using the service to provide feedback.

The majority of participants interviewed indicated a lack of awareness of telederm. "I didn't even know this was an option" (Physician participant). As part of the interview process, the investigator provided a brief overview of SAF consultative telederm. Interest in telederm and the potential for use in practice varied by training, experience, and geographic location. Participants located in the Mississippi Delta indicated high interest, as did APPs and pediatric physicians.

> "It sounds like it was written for rural health and rural health providers and patients just because you know, resources can often times be so limited and we do our best as family nurse practitioners and primary care providers, but sometimes you need that specialist eyes and their input and expertise. I think that a rural health clinic could greatly benefit from that type of resource" (APP participant).
>
> "I just think this is a great idea. Telederm sounds awesome" (Physician participant).
>
> "Obviously I haven't used it as of yet, but maybe in the future. I don't want to say I wouldn't use it. But I definitely, I see the benefits of telederm and I'm all for it" (Physician participant).
>
> "I personally don't think that we'll be utilizing that here. You know, it would be different if we didn't have the access to the dermatologists in Meridian. It probably would be a much more needed service if that weren't the case" (Physician participant).

Two physician participants noted that they were unaware of telederm as an option since entering practice, but were familiar with the concept and had utilized UMMC's SAF consultative telederm program while in residency training at UMMC. Both participants indicated that it was useful and were pleased to know that it was an option for external providers, demonstrating an opportunity to target recent trainees for increased awareness and use.

Pediatric dermatologists are in short supply nationally with the specialty being ranked by PCPs as one of the top three most difficult specialties to access (Fogel & Teng, 2015b, O'Connor et al., 2017). With a lack of board-certified pediatric dermatologists in the state of Mississippi, findings from the literature were echoed by pediatric physician

participants who communicated an openness and interest in telederm as an option, particularly for second opinions and triaging for face-to-face care. The state's network of rural pediatricians may best be accessed by the Department of Dermatology partnering with UMMC's children's hospital to advance pediatric telederm initiatives.

> "We could use the extra assistance on ones that just aren't getting better with a course of treatment" (Physician participant).

> "At least once a month, maybe every you know, three weeks or so that I'm seeing a pattern that's a little unique, a little different, and I would love for somebody's eyes to be on it as well, just to see" (Physician participant).

Theme 3: Perceived Value

Consistent with supporting literature, use of telederm for triaging urgency for face-to-face care and avoidance of unnecessary travel are perceived by participants as significant benefits (Lee et al., 2018; Pathipati, Lee, & Armstrong, 2011; Shigekawa et al., 2018). Considering that transportation was noted by rural Mississippi PCPs as a common barrier to dermatology access for patients, participants cited the avoidance of unnecessary travel for patients as one of the top perceived benefits of telederm. Whether as a result of resolution solely through telederm or through use to triage for urgency and need for face-to-face care, avoidance of unnecessary travel could be an important key to adoption.

> "If we could save at least half or more of these patients that otherwise might be having to head a pretty significant distance and not an insignificant burden for the patients, keep more than half of them from having to do that, that'd be awesome" (Physician participant).

> "It is a big thing for many of our patients to make a trip back and forth to Memphis for a clinic appointment so if we can have folks locally that's always a huge advantage" (Physician participant).

> "We give them access to a dermatology type specialist consultation without extensive travel and time away from their work" (Physician participant).

The focus and use of telederm as a triaging tool for escalating quicker face-to-face appointments when needed and decreasing wait time to diagnosis and treatment was perceived by participants as another key benefit, consistent with provider perceptions cited in the literature (Lee et al., 2018; McFarland et al., 2013).

"If they see something that looks more serious, then they can help us be able to get that set up even quicker. So in some ways, I think it would even be an advantage" (Physician participant).

"If once we've done the teledermatology, if there's not a resolution of the symptoms then it's usually easier to actually get them an appointment into dermatology" (APP participant).

"[Triaging] I think that may be one of the most important goals" (Physician participant).

Subtheme: Impact on workflow. Participants also noted the potential positive impact on workflow that could result from telederm, replacing the inefficiency of the trial and error approach to management of dermatologic conditions in rural PCP offices.

"To me that's a bit simpler than even picking up the phone and calling the guy that's a mile away, that's a dermatologist that I need to get a hold of. And he's busy seeing patients and I've got patients stacking up so while we're trying to get together on the phone to have a phone consultation, if I can snap a picture and send it electronically and have it looked at within a couple of days and get an answer back, that is in some ways even more convenient to me, especially as far as flow" (Physician participant).

"I feel like it would just get the patient treatment faster if anything as opposed to the nurse having to follow up on the referrals and waiting on the referral. And especially these with lack of insurance. Right now, they're having to go through the [UMMC] patient assistance program and get approved. I feel like that's just a long process. I would rather let's treat it and follow up and move on with it" (APP participant).

"They can just give some recommendations even electronically and say, I really don't even need to see this in clinic. Here's what you need to do. And that would probably help on the back end too. And freeing up access for the dermatologists" (Physician participant).

"If you think it's something you think you need to know pretty quickly, then it's a lot easier with the teledermatology" (APP participant).

"I'm going to see the patient anyway" (Physician participant).

"Once we got used to the flow of working it in, I think it could be valuable" (APP participant).

Subtheme: Consultative aspect. Participants were prompted for perceptions on the consultative aspect of SAF consultative telederm compared to the traditional referral pathway in which the dermatologist assumes treatment authority for the condition. Several participants pointed towards the consultative model as a benefit of SAF telederm with enhanced continuity of care and the use for second opinions noted as key benefits, both supported by literature (Anderson et al., 2018; Kane & Gillis, 2018).

> "I think keeping the general care with the PCP is a great thing. I'm a big fan of that and I think that patients, especially in rural places, they really want their care to predominantly come from their PCP. So, I can definitely see that being a benefit. The PCP is using the specialist as a true consultant like they should, but then being able to be the quarterback of that care" (Physician participant).

> "I prefer doing the continuity myself. I mean, I'd rather be involved in it. I don't like it when I send a patient somewhere and then I never know what happened. So, I mean, I'd actually prefer that aspect of it" (Physician participant).

> "Because a lot of times what we're looking for in primary care is 'what is this?' 'what else should we be doing now?' I've tried all these things and to give us an idea of what should be done next. And a lot of times that's what I'm asking from dermatologists, which is just to give me a consultation and suggest I try these things or to do this. That's enough for me" (Physician participant).

> "I always hate to refer things that I know that we can handle. And then sometimes in the real world we get some parents that say, hey we love you, but we want another opinion" (Physician participant).

Subtheme: Patient satisfaction. Several participants noted the potential impact on patient satisfaction and compliance as a potential benefit of telederm for patients. Although these perceptions are from the rural PCP point of view and not validated by patient perceptions, it is consistent with research that indicates high patient satisfaction with telederm offerings, particularly among rural patients (Coustasse, Sarkar, Abodunde, Metzger, & Slater, 2019; Lee et al., 2018; Marchell et al., 2017).

> "I struggle a lot with patient compliance. You know, they'll come in over and over for the same thing, but being concerned enough to go somewhere else is a different story. If it were something I could do in the clinic, it would be easier for them and then I feel like compliance would increase" (APP participant).

> "We will be able to have PCPs treat this level of care, which I think will improve patient satisfaction and probably cut down on the volume of patients that we punt to derm" (APP participant).

> "They don't want to wait a month for an answer. They want something a little quicker than that. So, I think the patients are much happier too" (APP participant).

> "We kind of forget how…skin conditions might not seem like a big issue but when you talk about self-confidence and all of that, I mean it really matters to the patient" (APP participant).

One participant did raise the question about financial cost to the patient in regards to patient satisfaction. "They like something until they know how much it costs or how much it's going to affect them or their insurance" (APP participant).

Theme 4: Perceived Liability

A significant number of participants noted the inability to see and touch as well as have a personal dialogue in real-time with the patient as perceived limitations to SAF consultative telederm. These perceptions echo previous work that investigated provider and patient preference for face-to-face care compared to telederm methods (Marchell et al., 2017). Other perceived limitations of telederm compared to face-to-face treatment include the inability to conduct full-body skin examinations and the inability to see and touch the condition. Also noted was a perceived impersonal aspect with the inability to engage patients in real-time dialogue. The inability to conduct full-body skin examinations is a limitation of telederm well supported within the literature and is a key reason telederm is often recommended for low-risk or low-complexity conditions (Creighton-Smith et al., 2017; Gendreau, et al., 2017; Warshaw et al., 2015).

> "The only downfall is just any with telehealth…sometimes you just want to put your hands on the patient. It's just not quite the same as far as seeing, feeling, looking at them" (APP participant).

> "There's really, I guess, no substitute for being hands on and right there seeing a patient and being able to touch and then also ask questions that we may have not thought of or didn't ask in the way that the dermatologist would want" (Physician participant).

> "I sometimes have a hard time seeing something that's in a picture form as opposed to right there. And you certainly don't necessarily get a texture and the feel or more things like that that you're not going to get from telemedicine. So, I

> feel like it's perhaps got some great opportunity, but telederm is one of those that could be hit and miss with technology" (Physician participant).
>
> "I think the real time feedback with the patient, you know, you're missing some of that information for the clinicians if it is the store and forward model like it sounds like. There's not that opportunity for sort of back and forth. And it could be that the questions that the primary care doctor asks would not be a full complement to what the dermatologist would ask. I think that can be a limitation" (Physician participant).
>
> "My only concern sometimes with telemedicine if anything, is that sometimes actually looking and touching and feeling it is an important part of the diagnosis. I can talk to someone for psych but for skin, unless I've got the right type of things to look at it, to magnify it or to look at it in real time that would be my concern. If it's not in real-time and it's just pictures and discussion only" (Physician participant).

Research has noted rural challenges regarding technical issues such as high-speed internet (Lin et al., 2018), which was echoed by rural Mississippi PCP feedback during interviews. Lack of reliable internet access and modern technology was relayed by participants as a potential limitation to adoption in a rural setting.

> "…internet, Wi-Fi capabilities, and sluggishness with the computer systems. Because you can have all the technology known to man…if it comes a cloud, sometimes the Wi-Fi is gone, you know, you just don't ever know" (APP participant).

Subtheme: Impact on workflow. Although some participants noted perceived benefits of SAF consultative telederm in regard to positive impact on workflow, others cited the potential negative impact on workflow as a likely barrier to adoption. Developing processes and applications that serve a variety of needs should be considered to increase adoption.

> "I'm probably just not quite as quick to refer to them as I would be if they did the prescribing and following" (APP participant).
>
> "We don't have time to stop clinic you know, to do a bunch of photos and things like that" (Physician participant).
>
> "With the speed that we see patients, trying to get them in and out, and if the technology is going to take me an extra 20 minutes to figure it out, I'm probably not going to do that as often as I'd like" (Physician participant).

Subtheme: Consultative aspect. Although not overly zealous about the practice, participants did not express significant concern with prescribing unfamiliar medications recommended by the consulting dermatologist. Most participants indicated a willingness to learn more about the recommendations and move forward with support and guidance from the consulting dermatologist.

> "Definitely if it's something I'm not familiar with, I would need to read up on that and do a little bit more education on it. But I mean, I would feel comfortable doing that with the guidance of somebody that's more knowledgeable in this area than I am" (APP participant).

> "I guess it depends on what it is, but I mean, if it's something that I've discussed with a dermatologist and I'm able to document all of that, then I think I would be okay with it" (Physician participant).

Theme 5: Misguided Assumptions

Along with poor awareness of telederm in particular, participants noted overall perceptions of telehealth that could negatively impact adoption of telederm. Perceptions were shared ranging from envisioning telehealth as cumbersome equipment and space requirements to the competitive threat of replacing physicians. An email received in response to social media recruitment efforts indicated concerns over competition to physicians posed by telehealth which further validated emerging theory based on participant interviews. One physician participant questioned whether telederm consults would be completed by a physician or nurse practitioner, then stated "that is one positive that it would be a doctor instead of a nurse practitioner that will be looking at it." Such sentiments support overarching concerns about competitive threats to physicians posed by telehealth.

> "This can be a dangerous thing if they're not realizing that some of these kids are being seen and already on other medicines" (Physician participant).

> "I wouldn't mind using telederm cause I mean, obviously it's different than some of the other telemedicine things out there" (Physician participant).

> "I kind of prefer the more old-school hands-on experience. I don't want to say that I'm against telemedicine, but I just, it's not my, not my top choice to use telemedicine for anything personally" (Physician participant).

> "And I know some of these hospitals now have nurse practitioners and they don't have doctors making rounds, the nurse practitioners are using telemedicine conferencing with a doctor if they need them to be in on something. Which again, I understand the financial burden to the hospital. So, when I'm thinking of telemedicine, I'm thinking more of that, not the telederm aspect of being able to simply I guess send the picture and get feedback" (Physician participant).

These misguided perceptions have left some physicians wary of embracing any initiative within the telehealth realm, including consultative telederm. It is possible that securing interview participation among this group was challenging because of such perceptions and that a future online survey may better solicit more in-depth feedback on this topic.

Theme 6: Looking Back and Moving Forward

Efficiency of processes and technology, along with a live-interactive video option, are key success factors communicated by participants that could positively influence adoption. In general, participants expressed willingness to engage in telederm for the benefit of patients, however acknowledged the need for efficiency because of high clinical demand. Workflow must be streamlined and mimic the ease of established informal channels. Participants also noted the importance of staff training and access for support staff to submit telederm referrals on behalf of the provider.

> "Nurse protocol…they can just basically have step-by-step instructions on how to do it so that the physician doesn't have to do it in the office given the time constraints. I think that would be more successful" (Physician participant).

Feedback regarding process and follow-up communication of UMMC's telederm program was provided by participants with experience utilizing the service. One participant noted potential redundancy and confusion regarding the intake form, stating "can't tell what part I'm supposed to fill out and what part [patients are] supposed to fill out" (APP participant). Participants also shared feedback regarding the benefit of direct conversation with the dermatologist following consult completion. Considering earlier discussion of a perceived benefit of telederm being an opportunity for enhanced communication between the PCP and specialist, incorporating a follow-up telephone call is a process worthy of exploration.

> "I think it would be helpful if we could have some type of actual phone call from the dermatologist that had taken the consult. Just like anything, whenever we put our stuff in [the EHR], you kind of just hope for the best" (Physician participant).

Subtheme: Live-interactive. Five participants, two of whom had utilized telederm previously, expressed a preference for LI video telederm as an option, either as an adjunct to SAF telederm or instead of SAF telederm. The primary reason noted was the ability to engage patients in real-time, a desire mirrored in previous research on provider perceptions of telederm (Marchell et al., 2017). It has been suggested that incorporating a hybrid of both LI and SAF telederm delivery models may be a strategy for future program development (Yim et al., 2018).

> "Allowing the patient to be there and the provider to be able to look live and give some immediate feedback, I think would be great" (APP participant).

> "Honestly, I would like to have someone who is actually talking to the patient themselves, briefly, to get an idea of what's going on. And having some sort of a video aspect connected to it, whether there's a magnifier or a dermascope that's associated with that ability. To open it up in some way, to put it on the lesion we're looking at or having a better picture that can be given and more than just a static photo" (Physician participant).

> "able to ask more questions or whatever maybe that we didn't think or I didn't think to ask. It would help them determine more of a diagnosis or anything from that standpoint" (Physician participant).
> "I think the store and forward works fine for a first pass, but I think access for real time interface would be very useful" (Physician participant).

Subtheme: Technology. The need for simple and reliable technology was a common theme among participants. One physician participant stated "these things can sound very simple and can be very challenging at the same time." Applications that allow for photo capture with direct upload, including the ability to capture and upload a photo of an intake form, were noted as potential solutions that could be incorporated into a busy clinic workflow. Another physician participant suggested that a tablet such as an iPad would "be ideal." In comments tied to technology, participants concurred with previous literature that training and photo quality are critical success factors (Bertrand et al., 2019; Naka et al., 2018).

> "You know, I do it through [the EHR] and it'll look good. But then once it's on the media tab in [the EHR], I don't know if it's cause it's blown up so big, it looks kind of grainy and distorted a little. And I know that the dermatologists, some of them have made comments about the quality of the photos" (APP participant) "I'm sure if we had training on, you know, these are the views that we want or if there some standards to that, then that would probably eliminate a lot of those concerns as well" (Physician participant).

Summary

The process of conducting personal, semi-structured interviews with rural PCPs regarding adoption of SAF consultative telederm provided several key insights related to the following questions:

1. What are rural primary care providers' perceptions of consultative telederm?
2. What are the perceptions of rural primary care providers regarding consultative telederm who are routinely utilizing it in practice?
3. What are the perceptions of rural primary care providers regarding consultative telederm who have not routinely adopted it in practice?

The findings as discussed in this chapter are in response to a combination of the three research questions because of the interdependent nature of the questions and resulting insights. By conducting this performance improvement project, the investigator found that there are no rural Mississippi PCPs routinely utilizing consultative telederm in practice according to recent referral records. As a result of 21 personal, semi-structured interviews, a number of themes emerged related to perceptions of dermatology access and adoption of SAF consultative telederm among rural PCPs who have either had minimal exposure or are unaware of telederm as an option. There are considerable perceived challenges to dermatology access for patients in rural Mississippi that have served to foster a self-reliance among rural PCPs when caring for dermatologic conditions. Although perceived liabilities to telederm exist among rural PCPs, there is a willingness to consider telederm as an option to increase dermatology access and avoid unnecessary travel for patients. By conducting personal, semi-structured interviews, this project gathered key perceptions of rural PCPs as to recommendations for optimal telederm use and finding a way forward, even in the face of perceived limitations and

misinformation that have influenced adoption.

The purpose of this performance improvement project was to explore the perceptions of dermatology access and adoption of consultative telederm among PCPs in rural Mississippi with the intent to provide departmental leadership with baseline data to serve as a building block for future investigation and process improvement. Based on findings, the author offers the following six key recommendations for programmatic consideration to enhance implementation:

1. Formally assess referring provider satisfaction
2. Form strategic partnerships
3. Leverage network of recent trainees
4. Further develop technology
5. Incorporate into access protocols
6. Target communication and education

Findings discussed in this chapter provide stakeholders with key insights into perceptions among rural PCPs that may best inform telederm process improvements and service offerings to meet the specific needs of PCPs practicing in rural Mississippi. Further discussion of findings and recommendations for improvement will be presented in chapter five.

IMPLEMENTATION

CHAPTER V
IMPLEMENTATION

It has been recognized that demand for dermatology services is anticipated to grow while the supply of dermatologists is anticipated to remain stagnant in coming years (Dall et al., 2013; Glazer & Rigel, 2017). Store-and-forward telederm is a solution that permits faster access to dermatology services and creates face-to-face clinic availability for more complex cases. Telederm has been validated as a method to increase access to dermatologic specialty care and ease physician workforce constraints, particularly for rural areas (Kahn et al., 2013; Landow et al., 2014; Landow et al., 2015; McFarland et al., 2013). Although the value of consultative telederm is widely supported by literature, adoption in daily practice among PCPs remains low (Armstrong et al. 2012b; Moore et al., 2017).

The purpose of this performance improvement project was to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi. This performance improvement project aimed to answer the following questions:

1. What are rural primary care providers' perceptions of consultative telederm?
2. What are the perceptions of rural primary care providers regarding consultative telederm who are routinely utilizing it in practice?
3. What are the perceptions of rural primary care providers regarding consultative telederm who have not routinely adopted it in practice?

Summary and Interpretation of Findings

Prior to this investigation, no known information existed specific to perceptions of dermatology access and adoption of consultative telederm among rural Mississippi PCPs. By conducting this performance improvement project, the investigator obtained key insights into the investigation questions. The qualitative analysis of data gathered through personal, semi-structured interviews led to the identification of a number of themes. Findings indicated that rural Mississippi PCPs perceive a number of challenges to dermatology access for patients that have served to foster a self-reliance among rural PCPs when caring for dermatologic conditions. Participants expressed a general lack of

awareness of telederm along with varying degrees of interest based on level of training and geographic location. Although perceived limitations to telederm exist along with misinformation about telehealth in general, there is a willingness among rural Mississippi PCPs to consider telederm as an option to increase dermatology access and avoid unnecessary travel for patients. By conducting personal, semi-structured interviews, this project gathered key perceptions of rural Mississippi PCPs as to recommendations for increased adoption of telederm.

Limitations

A primary limitation for this project was the number of rural Mississippi PCPs agreeing to participate in the interview process. It is possible that the investigation design of personal, semi-structured interviews, led to exclusion of participants who did not feel comfortable sharing negative perceptions. Another limitation is that perceptions of rural Mississippi PCPs were solicited in regards to dermatology access for patients without soliciting perceptions from patients themselves.

Application and Dissemination

By conducting this investigation to explore perceptions of dermatology access and adoption of consultative telederm among rural Mississippi PCPs, the investigator intended to generate findings to provide departmental leadership with baseline data to serve as a building block for future investigation and process improvement. Results and recommendations have been summarized (see Appendix E) and will be disseminated to clinical and departmental leadership of UMMC's departments of Dermatology and Center for Telehealth as key collaborators in telederm service offerings. In addition, an academic poster has been developed (see Appendix F) to aid in disseminating findings to key stakeholders and trainees.

Implementation science provides a context for understanding how to best integrate new programs and technology within existing healthcare systems. Efforts around effective implementation include planning and deployment, along with measurement of effectiveness and sustainability. Such efforts are of critical importance because the benefits from new programs and technology can only be realized if implementation consistently leads to intended adoption (Peracca, Jackson, Weinstock, & Oh, 2019). Based on findings, the author offers the following six key recommendations

for programmatic consideration to impact effective implementation:

1. Formally assess referring provider satisfaction
2. Form strategic partnerships
3. Leverage network of recent trainees
4. Further develop technology
5. Incorporate into access protocols
6. Target communication and education

Referring Provider Satisfaction

A formal user survey process, either by telephone or online survey methods, should be considered at the completion of each telederm consult to gather referring PCP feedback while the information is of greatest relevance in order to drive specific process improvement and better capture insights of those that have utilized telederm. With a focused, real-time solicitation of feedback, more routine utilization could be fostered, especially among those referring providers with a history of one-time use.

Rural Health Information Hub, a resource supported by HRSA, suggests the development of questions aimed at collecting information on how user-friendly the telehealth consultation experience is and whether it meets the referring provider's needs. Survey recommendations include a Likert-scale survey administered after a consult is completed (Rural Health Information Hub, n.d.). University of Arizona Health Sciences provides sample telehealth survey tools for both LI and SAF modes of delivery and for a variety of audiences through its Southwest Telehealth Resource Center. The author has adapted a sample SAF telehealth referring provider satisfaction survey (see Appendix G) to be utilized as a key evaluation method of determining telederm effectiveness (Southwest Telehealth Resource Center, n.d.).

Strategic Partnerships

Building a culture of health means developing an infrastructure and culture that provides all individuals an equal opportunity for a healthy life, regardless of race, socioeconomic status, and geographic location. Building a culture of health cannot be done by one organization's efforts alone and instead requires a collaboration of community partners and the leveraging of a community's existing strengths (Health Research and Educational Trust, 2016). Considering the high interest for telederm

among PCPs in the Mississippi Delta, a recommendation is to seek formal partnerships for joint efforts to increase access and dermatologic expertise for patients in the Mississippi Delta region. The Mississippi Delta region is comprised of 18 counties in Northwest Mississippi along or near the Mississippi River and has the highest poverty rates and lowest health rankings in the state (Wang, Crook, Connell, & Yadrick, 2017). The Mississippi Delta region is also one of the most disadvantaged areas of the United States in regards to socioeconomic determinants (Gennuso, Jovaag, Catlin, Rodock, & Park, 2016). Possible partnerships include networks of RHCs, Federally Qualified Health Centers (FQHC), and rural community hospitals located in this highly underserved area. One such organization is Delta Health Center, the first FQHC in the United States. Established in 1965, Delta Health Center is comprised of nine primary care clinic locations throughout the Mississippi Delta (Delta Health Center, 2020). By aligning with existing community networks, UMMC can leverage its strengths in a systematic approach.

Another key partnership for consideration is an alliance with UMMC's children's hospital and an initiative to brand telederm education and marketing materials with visuals and language specific to pediatric care. Interview findings revealed a strong interest in telederm among rural pediatric PCPs. This interest and need for pediatric dermatologic expertise is further supported by national data that skin conditions account for up to 30% of pediatric PCP visits and that 80% of pediatric PCPs report too few pediatric dermatologists to fully support the needs of their clinic practices (O'Connor et al., 2017). To add greater pediatric dermatology expertise to service offerings, UMMC's Department of Dermatology could explore contracting out-of-state pediatric board-certified dermatologists interested in becoming licensed in Mississippi and working remotely after-hours to help provide greater expertise and triaging capability via SAF consultative telederm. Integrating the efficient structures and processes of UMMC's Department of Dermatology and its children's hospital and ambulatory network could lead to more optimal functioning in building a culture of health through existing partnerships (Health Research and Educational Trust, 2016).

Leverage Network

University of Mississippi Medical Center's telederm program has been operational for the past several years, allowing an opportunity for UMMC residents to gain exposure to the program while in training. Incorporating the use of telederm into residency training programs is a way to build a foundation for future success (Campagna et al., 2017; Yim et al., 2018). As these residents complete training and join clinical practices throughout the state, UMMC should leverage its network of recent trainees and ensure they are aware of protocols to access the program as external providers. Through this effort, UMMC can extend its awareness by enlisting these recent trainees as ambassadors within their practices and communities.

Develop Technology

Based on participant feedback regarding the need for ease and efficiency as it relates to technology, collaborating departments should explore alternatives that may be more streamlined than the current workflow in *UView, Epic*'s external provider portal. With *Epic* currently being the most utilized EHR in the United States, several organizations, including Parkland Health and Hospital System in Dallas, Texas, have collaborated with *Epic* to optimize internal telederm workflows. There is potential to standardize this optimization nationally and move beyond internal use and find ways to optimize for external provider access (Carter et al., 2017).

Veterans Health Administration, one of the largest providers of telederm, recently worked with a federal contractor to develop a mobile application, *VA Telederm*, which is designed to streamline existing telederm workflow with the ability to capture and directly upload images as well as dictate patient intake information. The technology will be made available to participating facilities with those facilities being provided a tablet device for telederm-specific use (Done et al., 2018). Partnering with a commercial application developer with demonstrated EHR interoperability success to develop an application with such streamlined features, may be a viable alternative to *UView*, particularly considering that more than 80% of physicians use smartphones in the workplace and 38% of those physicians use medical-related applications daily (Brewer et al., 2013; Thomairy, Mummaneni, Alsalamah, Moussa, & Coustasse, 2015).

Access Protocols

Because of the perceived benefit for triaging along with UMMC's role as a safety-net for uninsured and Medicaid patients, UMMC should develop protocols that incorporate telederm as an option during the initial scheduling call for appropriate patient referrals. It is of critical importance for safety-net hospitals to utilize telederm to triage and prioritize for urgency and severity of condition to best improve access for underserved populations (Done et al., 2018). By incorporating a prompt to encourage referring providers to consider telederm as a first step for certain conditions and offering step-by-step assistance with the submission process, referring providers may be more willing to utilize telederm and therefore appropriately reserve face-to-face clinic availability for more complex conditions, delivering on the full potential of telederm.

Communication and Education

Lastly, interview participants indicated poor awareness of telederm as an option as well as misinformed perceptions around telehealth in general. As a leader in both realms for the state of Mississippi, UMMC should target increased education to PCPs throughout the state considering their role as key stakeholders in the advancement of telehealth initiatives. A lack of communication and coordination between PCPs and consulting dermatologists has surfaced as a barrier to adoption by some telederm programs. Therefore, a robust communication and education strategy are critical to effective implementation (Peracca et al., 2019). The American Telemedicine Association's Telederm Special Interest Group (n.d.) has developed a series of educational information and brochures with the referring provider in mind for its members to use as a foundation for communication efforts. In addition, patient testimonials of positive outcomes from telederm interventions could increase confidence in the program and demonstrate to PCPs the tangible benefits for patients (Ellimoottil, An, Moyer, Sossong, & Hollander, 2018).

In addition to SAF consultative telederm, the Extension for Community Healthcare Outcomes (ECHO) project approach has shown great promise in addressing limited access to dermatology and increasing education among PCPs. Dermatology focused ECHO is pioneered by the University of Missouri Department Of Dermatology and is based on the national telehealth ECHO model originally developed in New Mexico

to address management of Hepatitis C in rural populations. Dermatology ECHO utilizes a case-study, multidisciplinary approach to educate PCPs, build trust and extend dermatologic expertise in the midst of provider shortages (Lewis et al., 2018). University of Mississippi Medical Center participates in several ECHO initiatives including dermatologic (Cummins, 2019). Continued use of this model by the Department of Dermatology to increase awareness and build trust among rural PCPs should be fostered as part of the comprehensive telederm implementation strategy. By dispelling rumors and educating PCPs on the benefits of telehealth for patients and their role in its success, programs such as telederm could gain traction in adoption among rural Mississippi PCPs.

Recommendations for Future Investigation

The results of this investigation suggest there is more to learn about PCP perceptions of telehealth in general. Future investigations should consider an electronic questionnaire format in an attempt to increase response and elicit greater candor. Future investigation should also include efforts at gaining insight into patient perceptions of dermatology access and consultative telederm to ensure a well-rounded knowledge base for program improvement. In addition, future investigation should include key performance metrics such as appropriate utilization of face-to-face visits and unnecessary patient travel avoided to validate delivery on perceived value of SAF consultative telederm.

Conclusion

This performance improvement project explored perceptions of dermatology access and consultative telederm among PCPs in rural Mississippi. A series of 21 personal, semi-structured interviews resulted in six primary themes that serve as a foundation for future investigation and process improvement. Although some results were consistent with perceptions found in the literature, some attitudes and perceptions were somewhat surprising and may be the key to understanding lack of adoption of consultative telederm among PCPs in rural Mississippi. Finally, the investigator has offered a series of recommendations for departmental leadership to consider based on findings. These recommendations build upon the existing strength of UMMC's telederm program and platform while intending to be responsive to insights gained as a result of this project.

APPENDICES

APPENDIX A

Interview Invitation

The following example communication was sent via letter and email with telephone calls as needed for follow-up and interview coordination.

Dear Primary Care Provider,

My name is Karen Dowling and I am an employee as well as a doctoral student in the Health Administration program at the University of Mississippi Medical Center. I would like to request your participation in a semi-structured interview for my doctoral project. Over the course of this project, I seek to explore perceptions of access to dermatology services among PCPs in rural Mississippi and the use of teledermatology as a potential solution, as well as the potential barriers to adoption.

This project is particularly important to me on a personal level due to the impact of skin cancer within my family and the critical role early identification and intervention played in outcomes. Key information regarding the interviews is noted below:

Purpose

- For rural-based PCPs to share insight and perceptions in order to facilitate improvement of access to dermatology care for patients served

Anonymity/Confidentiality

- The interviews will be audio-recorded and transcribed. All responses will be de-identified and used solely for this project.
- Responses will be aggregated and shared at the thematic level only and all recordings will be destroyed by June 1, 2020.

Interviews can be completed by phone or in person if schedules allow. I respect the busy demands of your patient schedule and will limit interviews to 15 minutes in length. If you are willing to participate, please feel free to email me at kdowling@umc.edu or text me at 817-718-7363 with some available times or the name and contact information for the individual in your office that can help coordinate interview availability.

Thank you for your consideration. Your participation and insight into the challenges faced in securing dermatology care for your patients will be an important aspect in identifying solutions as the needs continue to grow. Please feel free to call, text or email at any time to comment or ask questions.

Thank you,

Karen Dowling
Cell #817-718-7363
Kdowling@umc.edu

APPENDIX B

Consent to Participate Form

CONSENT TO PARTICIPATE

Doctor of Health Care Administration Applied Research Project

The University of Mississippi Medical Center

Student Investigator: Karen Dowling

Principal Investigator: Dr. Amber Arnold

Committee Chair: Dr. Monte Luehlfing

Project Title: Exploring Perceptions of Dermatology Access and Adoption of Consultative Telederm Among Primary Care Providers in Rural Mississippi

You are being invited to take part in an investigation about access to dermatology care for rural Mississippi populations and adoption of teledermatology as a possible solution to improve access.

We are conducting this investigation to explore perceptions regarding adoption of teledermatology among primary care providers rural Mississippi. If you agree to this investigation, you will be asked to do the following:

- Participate in a semi-structured interview regarding your perceptions about dermatology access, experience with teledermatology, and barriers to adoption of teledermatology in daily practice.

Your participation in this investigation is voluntary. You do not have to answer any questions you do not want to answer. If at any time you do not want to continue with the interview, you may decline. Your time and involvement are greatly appreciated. The interview is expected to last no more than 20 minutes. To maintain the essence of your words for the investigation, the information will be audio recorded. At any time, you may request to see the information collected.

The interview will be transcribed by the interviewer and kept confidential in a password protected computer. All individual identification will be removed from the hard copy of

the transcript. Participant identity and confidentiality will be concealed using coding procedures. All data collected will be kept secure for six years and ultimately destroyed. Excerpts from the interview may be included in the final report or later publication. However, under no circumstances will your name or identifying characteristics appear in these writings. There are no anticipated risks associated with your participation in this investigation. Although you will receive no direct benefits, this investigation may increase knowledge around perceptions of rural primary care providers on the use of teledermatology and the perceived barriers to adoption. With this increased knowledge, health systems may be better able to provide solutions to increase use and improve access to dermatologic care for rural populations. This investigation meets the definition of quality assurance/improvement and does not require a review by the University of Mississippi Medical Center Institutional Review Board. If you have questions about this investigation or need to report any problems, please call Karen Dowling at 817-718-7363 or kdowling@umc.edu.

Statement of Participation

I have been told about this investigation and the possible risks and benefits. My participation is voluntary, and I may withdraw at any time without any penalty or loss of benefits to which I am entitled, including medical care at the University of Mississippi Medical Center.

By signing this form, I am not giving up any legal rights I may have.

_____

Participant's Printed Name

_____

Participant's Signature

_____

Date

_____

Printed Name of Person Obtaining Consent

_____

Signature of Person Obtaining Consent

_____

Date

Attached electronic communication verifying consent acceptable in lieu of signed form.

APPENDIX C

Interview Guide

Participant #:

Date:

Participant Demographics:

Rural Community_____

MD or NP

Internal Medicine / Family Medicine / Pediatrics

Referred to UMMC telederm before per referral tracking data?

UMMC trained? YES NO

Length of time in practice_____

Average number of patients seen in a day_____

Utilizing an Electronic Health Record? YES NO

Reported previous use of any form of telehealth? YES NO

Interview Questions:

- How would you describe availability of dermatology access for patients in your community?
- How would you describe the timeliness for obtaining dermatology appointments for your patients?
- Describe the dermatology related needs of your patients in a typical week or month.
- What barriers do you have for obtaining dermatology appointments for your patients?
- How would you describe your familiarity with Teledermatology (or telederm)?
    - Probe: If familiar:
        - What are the greatest benefits in your opinion?
        - What would you consider to be potential concerns or reasons not to use telederm?

- How would you describe your familiarity with UMMC's consultative telederm program?
    - If aware:
        - Tell me about your perceptions of the program.
        - How would you describe the referral process?
        - What would you change?
        - How would you describe the communication back from the dermatologist regarding diagnosis and treatment recommendations?
- Probe: If not familiar: What questions do you have about telederm?
    - After discussion:
        - Describe how you could envision using telederm in your practice.
        - Describe potential benefits of telederm for your patients.
        - Are there any concepts that cause concern or that may prevent you from using telederm?

- Tell me your thoughts regarding potential impact to your workload as a result of consultative telederm.
    - Probing question: How might you incorporate a telederm referral process into your workflow?
    - Describe the staffing resources you have available to help.
- Describe your comfort level prescribing a medication you are unfamiliar with.
- In a perfect world, what would a telederm program or process look like that would meet your needs?
    - Probing questions regarding bandwidth, electronic health record use, reimbursement
        - Is there anything else you think I should know?

APPENDIX D

Human Research Self-Certification Form

Self-Certification Form for Determining Whether a Proposed Activity is Research Involving Human Subjects

When to Use this Form:

1. If you need documentation for funding agencies, administrators, or collaborators
2. If you are unsure whether or not you need to submit your project to the IRB
3. If you are unsure if your project is research
4. If you are unsure if your research involves human subjects

This form is not an Exempt Certification or IRB review
Exemptions are a type of IRB review. If your project meets the definition of human subjects research you must submit the project to the IRB for review.

Administrative Information

Your Name	Karen H Dowling	Degree(s) + Department	Doctor of Health Administration
Mailing Address	2500 North State Street Jackson, MS 39216	Phone	601-815-7254
		Email	kdowling@umc.edu
Project/Study/Grant Title/Award#	Exploring Barriers to Adoption of Consultative Telederm Among Primary Care Providers in Rural Mississippi		

1) Is your project "research"?

"Research" is defined under 45 CFR 46.102(d) as a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities, which meet this definition, constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes.

Is your project a "systematic investigation"?	☐ No ☒ Yes *"Systematic investigation" is an activity that involves a prospective research plan that incorporates data collection, either quantitative or qualitative, and data analysis to answer a research question.* *Systematic investigation involves a predetermined method for studying a specific topic, answering a specific question, testing a specific hypothesis, or developing theory.* ***Examples of systematic investigations include, but are not limited to,** observational studies, interview (including those that are open-ended) or survey studies, group comparison studies, tool development, program evaluation and interventional research.*
Is the primary intent of the project to develop or contribute to generalizable knowledge?	☒ No ☐ Yes *Investigations designed to develop or contribute to **generalizable knowledge** are those designed to draw general conclusions (i.e., knowledge gained from a study which may be applied to populations outside of the specific study population), inform policy, or generalize findings.* *To develop or contribute to generalizable knowledge requires that the results (or conclusions) of the activity are intended to be extended beyond a single individual or an internal program.* *Intent to publish results/conclusions in a peer-reviewed journal or to present at a regional or national meeting does not determine this response. Thesis or dissertation projects conducted to meet the requirements of a graduate degree are usually considered generalizable.*

Examples of activities that are not considered research under the above definition:

- **Quality Assurance/Improvement:** Activities whose purposes are limited to: (a) implementing a practice to improve the quality of patient care and then (b) collecting patient or provider data regarding the implementation of the practice for clinical, practical, or administrative purposes. Planning to publish an account of a quality improvement or quality assurance project does not necessarily mean that the project fits the definition of research
- **Case Reports:** The external reporting (e.g., publication, poster or oral presentation) of an interesting clinical situation or medical condition of up to three patients. The patient information used in the report must have been originally collected solely for non-research purposes as the result of a clinical experience.
- **Public Health Surveillance:** A series of ongoing systematic activities, including collection, analysis, and interpretation of health-related data essential to planning, implementing, and evaluating public health practice closely integrated to the dissemination of data to those who need to know and linked to prevention and control.

If you answered **No** to one or both questions, you may stop here. You are not conducting research that needs to be reviewed by the IRB. A copy of this completed form should be maintained in your project file. Do not submit a copy of this form to the IRB.

If you answered **Yes** to both questions above, continue below.

2) Does your project involve "Human Subjects"?

Human Subject is defined under 45 CFR 46.102(f) as a living individual about whom an investigator conducting research obtains:

1. data through intervention or interaction with the individual, or
2. identifiable private information.

Does the project involve "intervention" or interaction with a human subject?	☐ No ☐ Yes *"Intervention" includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Interaction includes communication or interpersonal contact between investigator and subject.*
Does the project involve access, by PI or project personnel, to identifiable private information?	☐ No ☐ Yes *Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record).* *Private information must be individually identifiable (i.e., the identity of the subject is or may be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.*
Does the project involve receipt of data/specimens that were collected by another with identifiable private information?	☐ No ☐ Yes (and answer two questions below)

Are the data/specimens coded such that they could be re-identified?	☐ No ☐ Yes
Is there a written agreement that prohibits you and your staff access to the link?	☐ No ☐ Yes

If you answered **No** to all 3 questions in section 2, or **No** to the first two questions and **Yes** to the third question and both sub-parts you are not conducting research that needs to be reviewed by the IRB. A copy of this completed form should be maintained in your project file. Do not submit a copy of this form to the IRB.

Any other combination of answers means that the proposed activity may be research that involves human subjects. You must submit an application to the IRB before starting your project. Visit the IRB's website, umc.edu/irb or call the Human Research Office, 601 984-2815 for more information.

Your Signature

Date	08/19/2019
Print Name	Karen H Dowling
Signature	

I certify that the information above is true and accurate.

APPENDIX E

Summary of Findings and Recommendations

Exploring Perceptions of Dermatology Access and the Adoption of Consultative Telederm Among Primary Care Providers in Rural Mississippi

Prepared by Karen H. Dowling

Abstract

Store-and-forward (SAF) consultative telederm has been shown to be a flexible and effective platform for delivering specialized dermatology guidance related to the diagnosis and management of skin disorders. Store-and-forward telederm permits faster access to dermatology services and is linked to rapid access that creates face-to-face clinic availability for more complex cases that require in-person care. For states such as Mississippi with a limited number of dermatologists, developing provider resources for complex cases with potentially malignant skin disorders is critical. Although research regarding telehealth in general has shown high satisfaction rates among referring physicians and patients throughout the United States, primary care providers (PCPs) continue to demonstrate low adoption rates of consultative telederm. This performance improvement included an exploration of perceptions regarding dermatology access and adoption of consultative telederm among 21 PCPs in rural Mississippi through personal, semi-structured interviews. Findings provide stakeholders key insights into perceptions among rural PCPs and recommendations for implementation that may best inform telederm process improvements and service offerings to meet the specific needs of PCPs practicing in rural Mississippi.

Participant Overview

21 PCPs interviewed from various rural Mississippi regions

- 43% Family Practice or Internal Medicine physicians; 38% Advance Practice Providers; 19% Pediatric physicians
- <1 year to 26 years practice experience
- 52% reported previous telehealth use
- 76% trained at UMMC

Six Themes

1. Challenges Leading to Self-reliance
   - Perceived barriers to dermatology access for patients have led to a self-reliance among rural Mississippi PCPs.
     - This self-reliance results in an inefficient trial and error approach.
     - Informal channels such as texting and telephone assistance have evolved as a result of access challenges.
     - UMMC serves as Mississippi's safety-net for uninsured and Medicaid patients requiring dermatologic specialty care.

2. Exposure and Demand
   - Rural Mississippi PCPs are unaware of telederm as an option and have various degrees of interest based on training, experience, and geographic location.

3. Perceived Value
   - Use of telederm for triaging urgency for face-to-face care and avoidance of unnecessary travel are perceived as significant benefits.
     - Potential positive impact on workflow noted by replacing the inefficient trial and error approach.
     - Enhanced continuity of care is perceived as a benefit of the consultative aspect of SAF telederm.
     - Patient satisfaction and increased compliance are perceived as benefits of telederm for patients.

4. Perceived Liability
   - Inability to see and touch as well as have a personal dialogue in real time with the patient are perceived as limitations of SAF telederm.
     - Some noted impact on workflow as a potential barrier to adoption.
     - Although not strongly favored when unfamiliar with recommended treatment regimen, most rural PCPs are comfortable with following dermatology recommendations if guidance and support is readily available.

5. Misguided Assumptions
   - Overall perceptions of telehealth exist that have the potential to negatively impact adoption of telederm.

6. Looking Back and Moving Forward
    - Participants expressed willingness to engage in telederm for the benefit of patients.
        - Several participants expressed a preference for live-interactive video telederm to be able to engage patients in real-time.
        - The need for simple and reliable technology was conveyed as a critical key for adoption.

Recommendations for Enhanced Implementation

1. Formally assess referring provider satisfaction to drive process improvement
2. Form strategic partnerships to leverage existing strengths in rural Mississippi communities
3. Leverage network of recent trainees to build a foundation for future success and a team of ambassadors within their practices and communities
4. Further develop technology for ease and efficiency
5. Incorporate into access protocols to ensure telederm is presented as an option early in the referral process
6. Target communication and education to rural PCPs using a variety of methods

APPENDIX F

Academic Poster

DERMATOLOGY ACCESS AND ADOPTION OF TELEDERM IN RURAL MISSISSIPPI

Karen Dowling, DHA, Monte Luehlfing, DHA, Amber Arnold, DNP, RN, Robert Brodell, MD, Angela Burrell, PhD, RN, Alan Jones, MD
University of Mississippi Medical Center School of Health Related Professions

ABSTRACT

PROBLEM: Store-and-forward (SAF) consultative telederm has been shown to be a flexible and effective platform for delivering specialized dermatology guidance related to the diagnosis and management of skin disorders and is linked to rapid access that creates face-to-face clinic availability for more complex cases that require in-person care. Although research regarding telehealth in general has shown high satisfaction rates among referring physicians and patients throughout the United States, primary care providers (PCPs) continue to demonstrate low adoption rates of consultative telederm.

PURPOSE: The purpose of this performance improvement project was to explore perceptions regarding dermatology access and adoption of consultative telederm among PCPs in rural Mississippi through personal, semi-structured interviews.

QUESTIONS TO BE ANSWERED: 1. What are rural primary care providers' perceptions of consultative telederm? 2. What are the perceptions of rural primary care providers regarding consultative telederm who are routinely utilizing it in practice? 3. What are the perceptions of rural primary care providers regarding consultative telederm who have not routinely adopted it in practice?

CONCLUSIONS: As a result of 21 personal, semi-structured interviews, six primary themes were identified. There are considerable perceived challenges to dermatology access for patients in rural Mississippi that have served to foster a self-reliance among rural PCPs when caring for dermatologic conditions. Although perceived liabilities to telederm exist among rural PCPs, there is a willingness to consider telederm as an option to increase dermatology access and avoid unnecessary travel for patients.

BACKGROUND

- Demand for Dermatology Services is expected to grow while supply of dermatologists is expected to remain stagnant (Dall et al., 2013; Glazer & Rigel, 2017).
- Telederm is a clinically viable platform to increase access to dermatology expertise and better utilize scarce physician resources, particularly for rural areas(Kahn, Sossong, Goh, Carpenter, & Goldstein, 2013; Landow, Mateus, Korgavkar, Nightingale, & Weinstock, 2014; Landow, Oh, & Weinstock, 2015; McFarland, Raugi, & Reiber, 2013) .
- Although the value of consultative telederm is widely recognized, adoption in daily practice among PCPs remains low (Armstrong et al. 2012; Moore et al., 2017).

METHODOLOGY

This performance improvement project was designed using an individual, semi-structured interview approach to explore perceptions regarding dermatology access and adoption of telederm among PCPs in rural Mississippi.

- 21 PCPs interviewed by telephone from various rural Mississippi regions
- 43% Family Practice or Internal Medicine physicians
- 38% Advance Practice Providers
- 19% Pediatric physicians
- <1 year to 26 years practice experience
- 52% reported previous telehealth use
- 76% trained at UMMC

Figure 1. This figure illustrates participant geographic distribution throughout Mississippi.

- Interviews were audio-recorded digitally with the permission of the participants and immediately transcribed to text using Temi software application.
- Transcriptions of interviews were reviewed multiple times and hand-coded by the investigator to identify common themes and then further reduced into subthemes and associations.

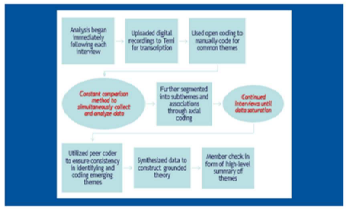

Figure 2. This figure illustrates the qualitative analysis process involved in this investigation.

FINDINGS

- Perceived barriers to dermatology access for patients have led to a self-reliance among rural Mississippi PCPs.
- Rural Mississippi PCPs are unaware of telederm as an option and have various degrees of interest based on training, experience, and geographic location.
- Use of telederm for triaging urgency for face-to-face care and avoidance of unnecessary travel are perceived as significant benefits.
- Inability to see and touch as well as have a personal dialogue in real time with the patient are perceived as limitations of SAF telederm.
- Overall perceptions of telehealth exist that have the potential to negatively impact adoption of telederm.
- Participants expressed willingness to engage in telederm for the benefit of patients.

Figure 3. This figure illustrates grounded theory emerging from participants' shared experiences.

CONCLUSIONS

Findings identified perceptions of considerable challenges to dermatology access for patients in rural Mississippi that have served to foster a self-reliance among rural PCPs when caring for dermatologic conditions. Participants expressed a general lack of awareness of telederm along with varying degrees of interest related to level of training and geographic location. Although some results were consistent with perceptions found in the literature, some attitudes and perceptions were somewhat surprising and may be the key to understanding lack of adoption of consultative telederm among PCPs in rural Mississippi.

Future investigation should consider an electronic questionnaire format in an attempt to increase response and elicit greater candor. Future investigation should also include efforts at gaining insight into patient perceptions of dermatology access and consultative telederm as well key performance metrics such as appropriate utilization of face-to-face visits and unnecessary patient travel avoided to validate delivery on perceived value of SAF consultative telederm.

REFERENCES

Armstrong, A. W., Kwong, M. W., Chase, E. P., Ledo, L., Nesbitt, T. S., & Shewry, S. L. (2012). Why some dermatologists do not practice store-and-forward teledermatology. Archives of Dermatology, 148(5), 649-650.
Dall, T. M., Gallo, P. D., Chakrabarti, R., West, T., Semilla, A. P., & Storm, M. V. (2013). An aging population and growing disease burden will require a large and specialized health care workforce by 2025. Health Affairs, 32(11), 2013-2020.
Glazer, A. M., & Rigel, D. S. (2017). Analysis of trends in geographic distribution of US dermatology workforce density. JAMA Dermatology, 153(5), 472-473.
Kahn, E., Sossong, S., Goh, A., Carpenter, D., & Goldstein, S. (2013). Evaluation of skin cancer in Northern California Kaiser Permanente's store-and-forward teledermatology referral program. Telemedicine and E-Health, 19(10), 780-785.
Landow, S. M., Mateus, A., Korgavkar, K., Nightingale, D., & Weinstock, M. A. (2014). Teledermatology: Key factors associated with reducing face-to-face dermatology visits. Journal of the American Academy of Dermatology, 71(3), 570-576.
Landow, S. M., Oh, D. H., & Weinstock, M. A. (2015). Teledermatology within the Veterans Health Administration, 2002–2014. Telemedicine and E-Health, 21(10).
McFarland, L. V., Raugi, G. J., & Reiber, G. E. (2013). Primary care provider and imaging technician satisfaction with a teledermatology project in rural Veterans Health Administration clinics. Telemedicine and E-Health, 19(11), 835-825.
Moore, M. A., Coffman, M., Jetty, A., Klink, K., Petterson, S., & Bazemore, A. (2017). Family physicians report considerable interest in, but limited use of, telehealth services. The Journal of the American Board of Family Medicine, 30(3), 320-330.

APPENDIX G

Sample Referring Provider Satisfaction Survey

Store-And-Forward Telederm Program Satisfaction Survey: Referring Provider

Name _____ Date _____ Specialty _____

Site _____

Instructions: Please rate the following on a scale of 1 to 6 where 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, and 6 = strongly agree. Additional comments are appreciated. Thank you for your time.

Survey	Disagree					Agree
1. I could communicate adequately with the consulting dermatologist.	1	2	3	4	5	6
2. I feel I was able to provide sufficient information for the dermatologist to diagnose this problem.	1	2	3	4	5	6
3. The dermatologist seemed to understand the problem.	1	2	3	4	5	6
4. The dermatologist changed my diagnosis or treatment on this case.	1	2	3	4	5	6
5. The process of photo capture was too time-consuming.	1	2	3	4	5	6
6. Technical difficulties made this process too time-consuming.	1	2	3	4	5	6
7. Overall the system was easy to use.	1	2	3	4	5	6
9. Telederm improves clinical efficiency.	1	2	3	4	5	6
10. I would prefer a face-to-face visit with the dermatologist rather than a telederm visit.	1	2	3	4	5	6
11. This telederm consult was as good as a face-to-face encounter.	1	2	3	4	5	6
12. Overall, I am satisfied with telederm.	1	2	3	4	5	6

Additional Comments:

Adapted from Southwest Telehealth Resource Center example survey. Retrieved from https://southwesttrc.org/resources/forms

APPENDIX H

Fair Use Statement

THE UNIVERSITY OF MISSISSIPPI
MEDICAL CENTER
EDUCATION • RESEARCH • HEALTHCARE

School of Health Related Professions
Doctor of Health Administration
2500 North State Street • Jackson, Mississippi 39216
Phone: 601.984.6300 • Fax: 601.984.6344

The Doctor of Health Administration Advisory Committee for Karen Dowling has reviewed materials within this document and determined whether the materials are in the public domain, or are within fair use, or require permission.

Required permission has been obtained, if warranted, and no material included should jeopardize availability of the doctoral project through the repository or *ProQuest Dissertations and Theses* (PQDT) database.

Monte Lively

Chair, Doctor of Health Administration Advisory Committee

4/8/2020

Date

LITERATURE CITED

LITERATURE CITED

American Academy of Family Physicians. (2019). Primary Care. Retrieved from https://www.aafp.org/about/policies/all/primary-care.html

American Cancer Society. (2019). American Cancer Society- Cancer Facts & Statistics. Retrieved from https://cancerstatisticscenter.cancer.org/#!/cancer-site/Melanoma%20of%20the%20skin

American Telemedicine Association. (n.d.). Teledermatology. Retrieved from https://www.americantelemed.org/community/teledermatology/

American Telemedicine Association. (2018). Telehealth FAQs. Retrieved from http://www.americantelemed.org/main/about/about-telemedicine/telemedicine-faqs

Anderson, D., Villagra, V. G., Coman, E., Ahmed, T., Porto, A., Jepeal, N., . . . Teevan, B. (2018). Reduced cost of specialty care using electronic consultations for Medicaid patients. *Health Affairs, 37*(12), 2031-2036. doi:10.1377/hlthaff.2018.05124

Armstrong, A. W., Kwong, M. W., Ledo, L., Nesbitt, T. S., & Shewry, S. L. (2011). Practice models and challenges in teledermatology: A study of collective experiences from teledermatologists. *PLoS ONE, 6*(12). doi:10.1371/journal.pone.0028687

Armstrong, A. W., Kwong, M. W., Chase, E. P., Ledo, L., Nesbitt, T. S., & Shewry, S. L. (2012a). Teledermatology operational considerations, challenges, and benefits: The referring providers' perspective. *Telemedicine and E-Health, 18*(8), 580-584. doi:10.1089/tmj.2011.0241

Armstrong, A. W., Kwong, M. W., Chase, E. P., Ledo, L., Nesbitt, T. S., & Shewry, S. L. (2012b). Why some dermatologists do not practice store-and-forward teledermatology. *Archives of Dermatology, 148*(5), 649-650. doi:10.1001/archdermatol.2012.42

Armstrong, A. W., Wu, J., Kovarik, C. L., Goldyne, M. E., Oh, D. H., McKoy, K. C., . . . Pak, H. S. (2012). State of teledermatology programs in the United States. *Journal of the American Academy of Dermatology, 67*(5), 939-944. doi:10.1016/j.jaad.2012.02.019

Association of American Medical Colleges. (2015). Mississippi Physician Workforce Profile. Retrieved from https://www.aamc.org/download/447194/data/mississippiprofile.pdf

Barbieri, J. S., Nelson, C. A., Bream, K. D., & Kovarik, C. L. (2015). Primary care providers' perceptions of mobile store-and-forward teledermatology. *UC Davis Dermatology Online Journal, 21*(8). Retrieved from https://escholarship.org/uc/item/2jt0h05w

Barnett, M. L., Yee, H. F., Mehrotra, A., & Giboney, P. (2017). Los Angeles safety-net program eConsult system was rapidly adopted and decreased wait times to see specialists. *Health Affairs, 36*(3), 492-499. doi:10.1377/hlthaff.2016.1283

Bertrand, S. E., Weinstock, M. A., & Landow, S. M. (2019). Teledermatology outcomes in the Providence Veterans Health Administration. *Telemedicine and E-Health*. doi:10.1089/tmj.2018.0242

Brewer, A. C., Endly, D. C., Henley, J., Amir, M., Sampson, B. P., Moreau, J. F., & Dellavalle, R. P. (2013). Mobile applications in dermatology. *JAMA Dermatology, 149*(11), 1300. doi:10.1001/jamadermatol.2013.5517

Caldwell, J. T., Ford, C. L., Wallace, S. P., Wang, M. C., & Takahashi, L. M. (2016). Intersection of living in a rural versus urban area and race/ethnicity in explaining access to health care in the United States. *American Journal of Public Health, 106*(8), 1463-1469. doi:10.2105/ajph.2016.303212

Campagna, M., Naka, F., & Lu, J. (2017). Teledermatology: An updated overview of clinical applications and reimbursement policies. *International Journal of Women's Dermatology, 3*(3), 176-179. doi:10.1016/j.ijwd.2017.04.002

Carter, Z. A., Goldman, S., Anderson, K., Li, X., Hynan, L. S., Chong, B. F., & Dominguez, A. R. (2017). Creation of an internal teledermatology store-and-forward system in an existing electronic health record. *JAMA Dermatology, 153*(7), 644-650. doi:10.1001/jamadermatol.2017.0204

Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *The Qualitative Report, 21*(5), 811-831. Retrieved from http://nsuworks.nova.edu/tqr/vol21/iss5/2

Charmaz, K. (2014). *Constructing grounded theory*. London: SAGE.

Chen, A. H., Kushel, M. B., Grumbach, K., & Yee, H. F. (2010). A safety-net system gains efficiencies through 'eReferrals' to specialists. *Health Affairs, 29*(5), 969-971. doi:10.1377/hlthaff.2010.0027

Clark, A. K., Bosanac, S., Ho, B., & Sivamani, R. K. (2018). Systematic review of mobile phone-based teledermatology. *Archives of Dermatological Research, 310*(9), 675-689. doi:10.1007/s00403-018-1862-4

Coates, S. J., Kvedar, J., & Granstein, R. D. (2015). Teledermatology: From historical perspective to emerging techniques of the modern era. *Journal of the American Academy of Dermatology, 72*(4), 563-574. doi:10.1016/j.jaad.2014.07.061

Cook, S. E., Palmer, L. C., & Shuler, F. D. (2015). Smartphone mobile applications to enhance diagnosis of skin cancer: A guide for the rural practitioner. *West Virginia Medical Journal, 111*(5), 22-28. Retrieved from https://mds.marshall.edu/cgi/viewcontent.cgi?article=1055&context=miir_faculty

Corbin, J. M., & Strauss, A. L. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Los Angeles, CA: Sage.

Coustasse, A., Sarkar, R., Abodunde, B., Metzger, B. J., & Slater, C. M. (2019). Use of teledermatology to improve dermatological access in rural areas. *Telemedicine and E-Health, 25*(11), 1022-1032. doi:10.1089/tmj.2018.0130

Creighton-Smith, M., Murgia, R. D., Konnikov, N., Dornelles, A., Garber, C., & Nguyen, B. T. (2017). Incidence of melanoma and keratinocytic carcinomas in patients evaluated by store-and-forward teledermatology vs. dermatology clinic. *International Journal of Dermatology, 56*(10), 1026-1031. doi:10.1111/ijd.13672

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: SAGE Publications.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches*. Los Angeles: SAGE.

Cronin, P. R., Decoste, L., & Kimball, A. B. (2013). A multivariate analysis of dermatology missed appointment predictors. *JAMA Dermatology, 149*(12), 1435. doi:10.1001/jamadermatol.2013.5771

Cummins, R. (2019). Hepatitis C provider education echoes throughout Mississippi. Retrieved from https://www.umc.edu/news/News_Articles/2019/10/Project-ECHO.html

Cunningham, S. A., Yu, R., & Shete, S. (2019). Differences in sun protection behaviors between rural and urban communities in Texas. *The Journal of Rural Health, 35*(2), 155-166. doi:10.1111/jrh.12350

Dall, T. M., Gallo, P. D., Chakrabarti, R., West, T., Semilla, A. P., & Storm, M. V. (2013). An aging population and growing disease burden will require a large and specialized health care workforce by 2025. *Health Affairs, 32*(11), 2013-2020. doi:10.1377/hlthaff.2013.0714

Delta Health Center. (2020). Delta Health Center: A healthier Delta. Retrieved from https://deltahealthcenter.org/

Done, N., Oh, D. H., Weinstock, M. A., Whited, J. D., Jackson, G. L., King, H. A., . . . Prentice, J. C. (2018). VA Telederm study: Protocol for a stepped-wedge cluster randomised trial to compare access to care for a mobile app versus a workstation-based store-and-forward teledermatology process. *BMJ Open, 8*(12). doi:10.1136/bmjopen-2018-022218

Ellimoottil, C., An, L., Moyer, M., Sossong, S., & Hollander, J. E. (2018). Challenges and opportunities faced by large health systems implementing telehealth. *Health Affairs, 37*(12), 1955-1959. doi:10.1377/hlthaff.2018.05099

Ferrante, J. M., Cohen, D. J., & Crosson, J. C. (2010). Translating the patient navigator approach to meet the needs of primary care. *The Journal of the American Board of Family Medicine, 23*(6), 736-744. doi:10.3122/jabfm.2010.06.100085

Fogel, A. L., & Teng, J. M. (2015a). A survey to assess perceived differences in referral pathways to board-certified pediatric dermatologists. *Pediatric Dermatology, 32*(6), 314-315. doi:10.1111/pde.12703

Fogel, A. L., & Teng, J. M. (2015b). The U.S. pediatric dermatology workforce: An assessment of productivity and practice patterns. *Pediatric Dermatology, 32*(6), 825-829. doi:10.1111/pde.12680

Foley, G., & Timonen, V. (2014). Using grounded theory method to capture and analyze health care experiences. *Health Services Research, 50*(4), 1195-1210. doi:10.1111/1475-6773.12275

Gemelas, J., Capulong, D., Lau, C., Mata-Diaz, S., & Raugi, G. J. (2019). Positive predictive value of melanoma diagnosis in store-and-forward teledermatology. *Telemedicine and E-Health, 25*(8), 701-707. doi:10.1089/tmj.2018.0056

Gendreau, J. L., Gemelas, J., Wang, M., Capulong, D., Lau, C., Bratten, D. M., . . . Raugi, G. J. (2017). Unimaged melanomas in store-and-forward teledermatology. *Telemedicine and E-Health, 23*(6), 517-520. doi:10.1089/tmj.2016.0170

Gennuso, K. P., Jovaag, A., Catlin, B. B., Rodock, M., & Park, H. (2016). Assessment of factors contributing to health outcomes in the eight states of the Mississippi Delta region. *Preventing Chronic Disease, 13*. doi:10.5888/pcd13.150440

Glazer, A. M., & Rigel, D. S. (2017). Analysis of trends in geographic distribution of US dermatology workforce density. *JAMA Dermatology, 153*(5), 472-473. doi:10.1001/jamadermatol.2016.6032

Guy, G. P., Machlin, S. R., Ekwueme, D. U., & Yabroff, K. R. (2015). Prevalence and costs of skin cancer treatment in the U.S., 2002−2006 and 2007−2011. *American Journal of Preventive Medicine, 48*(2), 183-187. doi:10.1016/j.amepre.2014.08.036

Health Research and Educational Trust. (2016, August). Creating effective hospital-community partnerships to build a Culture of Health. Retrieved from http://www.hpoe.org/Reports-HPOE/2016/creating-effective-hospital-community-partnerships.pdf

Kahn, E., Sossong, S., Goh, A., Carpenter, D., & Goldstein, S. (2013). Evaluation of skin cancer in Northern California Kaiser Permanente's store-and-forward teledermatology referral program. *Telemedicine and E-Health, 19*(10), 780-785. doi:10.1089/tmj.2012.0260

Kallio, H., Pietilä, A., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing, 72*(12), 2954-2965. doi:10.1111/jan.13031

Kane, C. K., & Gillis, K. (2018). The use of telemedicine by physicians: Still the exception rather than the rule. *Health Affairs, 37*(12), 1923-1930. doi:10.1377/hlthaff.2018.05077

Lamel, S. A., Haldeman, K. M., Ely, H., Kovarik, C. L., Pak, H., & Armstrong, A. W. (2012). Application of mobile teledermatology for skin cancer screening. *Journal of the American Academy of Dermatology, 67*(4), 576-581. doi:10.1016/j.jaad.2011.11.957

Landow, S. M., Mateus, A., Korgavkar, K., Nightingale, D., & Weinstock, M. A. (2014). Teledermatology: Key factors associated with reducing face-to-face dermatology visits. *Journal of the American Academy of Dermatology, 71*(3), 570-576. doi:10.1016/j.jaad.2014.02.021

Landow, S. M., Oh, D. H., & Weinstock, M. A. (2015). Teledermatology within the Veterans Health Administration, 2002–2014. *Telemedicine and E-Health, 21*(10), 769-773. doi:10.1089/tmj.2014.0225

Lee, K., Finnane, A., & Soyer, H. P. (2018). Recent trends in teledermatology and teledermoscopy. *Dermatology Practical & Conceptual, 8*(3), 214-223. doi:10.5826/dpc.0803a013

Lewis, H., Becevic, M., Myers, D., Helming, D., Mutrux, R., Fleming, D., & Edison, K. (2018). Dermatology echo – an innovative solution to address limited access to dermatology expertise. *Rural and Remote Health, 18*(1). doi:10.22605/rrh4415

Lin, C. C., Dievler, A., Robbins, C., Sripipatana, A., Quinn, M., & Nair, S. (2018). Telehealth in health centers: Key adoption factors, barriers, and opportunities. *Health Affairs, 37*(12), 1967-1974. doi:10.1377/hlthaff.2018.05125

Mansouri-Rad, P., Mahmood, M. A., Thompson, S. E., & Putnam, K. (2013). Culture matters: Factors affecting the adoption of telemedicine. *2013 46th Hawaii International Conference on System Sciences*. doi:10.1109/hicss.2013.157

Marchell, R., Locatis, C., Burgess, G., Maisiak, R., Liu, W., & Ackerman, M. (2017). Patient and provider satisfaction with teledermatology. *Telemedicine and E-Health, 23*(8), 684-690. doi:10.1089/tmj.2016.0192

Martin, A. B., Probst, J. C., Shah, K., Chen, Z., & Garr, D. (2011). Differences in readiness between rural hospitals and primary care providers for telemedicine adoption and implementation: Findings from a statewide telemedicine survey. *The Journal of Rural Health, 28*(1), 8-15. doi:10.1111/j.1748-0361.2011.00369.x

Mayer, J. E. (2015). Reimbursement for teledermatology in the United States: A review. *Health and Technology, 5*(2), 67-71. doi:10.1007/s12553-015-0103-5

McFarland, L. V., Raugi, G. J., & Reiber, G. E. (2013). Primary care provider and imaging technician satisfaction with a teledermatology project in rural Veterans Health Administration clinics. *Telemedicine and E-Health, 19*(11), 815-825. doi:10.1089/tmj.2012.0327

Mississippi Rural Health Association. (2017, March 26). Am I Rural? Retrieved from https://msrha.org/am-i-rural/

Mississippi State Department of Health. (2018, July). Directory of Mississippi Health Facilities. Retrieved from https://msdh.ms.gov/msdhsite/_static/30,0,83,613.html

Mississippi Telehealth Association. (n.d.). Laws and Regulations for Telehealth. Retrieved November 29, 2018, from https://www.mstelehealth.org/laws-and-regulations-for-telehealth/

Mohan, G. C., Molina, G. E., & Stavert, R. (2018). Store and forward teledermatology improves dermatology knowledge among referring primary care providers: A survey-based cohort study. *Journal of the American Academy of Dermatology, 79*(5), 960-961. doi:10.1016/j.jaad.2018.05.006

Moore, M. A., Coffman, M., Jetty, A., Klink, K., Petterson, S., & Bazemore, A. (2017). Family physicians report considerable interest in, but limited use of, telehealth services. *The Journal of the American Board of Family Medicine, 30*(3), 320-330. doi:10.3122/jabfm.2017.03.160201

Morris, J. (2016, August 12). Optimizing the value of advanced practice providers. Retrieved from https://www.studergroup.com/resources/articles-and-industry-updates/insights/august-2016/optimizing-the-value-of-advanced-practice-provider

Moustafa, F. A., Ramsey, L., Huang, K. E., & Huang, W. H. (2015). Factors associated with missed dermatology appointments. *Cutis, 96*, E20-E23. Retrieved from https://mdedge-files-live.s3.us-east-2.amazonaws.com/files/s3fs-public/issues/articles/media_3506404_CT096011020_e.PDF

National Association of Rural Health Clinics. (n.d.). RHC Overview. Retrieved November 25, 2018, from https://narhc.org/about-us/rhc-overview/

National Institutes of Health. (n.d.). National Cancer Institute Dictionary of Cancer Terms. Retrieved from https://www.cancer.gov/publications/dictionaries/cancer-terms

Naka, F., Lu, J., Porto, A., Villagra, J., Wu, Z. H., & Anderson, D. (2018). Impact of dermatology eConsults on access to care and skin cancer screening in underserved populations: A model for teledermatology services in community health centers. *Journal of the American Academy of Dermatology, 78*(2), 293-302. doi:10.1016/j.jaad.2017.09.017

Nelson, C. A., Takeshita, J., Wanat, K. A., Bream, K. D., Holmes, J. H., Koenig, H. C., . . . Kovarik, C. L. (2016). Impact of store-and-forward (SAF) teledermatology on outpatient dermatologic care: A prospective study in an underserved urban primary care setting. *Journal of the American Academy of Dermatology, 74*(3), 484-490. doi:10.1016/j.jaad.2015.09.058

O'Connor, D. M., Jew, O. S., Perman, M. J., Castelo-Soccio, L. A., Winston, F. K., & McMahon, P. J. (2017). Diagnostic accuracy of pediatric teledermatology using parent-submitted photographs. *JAMA Dermatology, 153*(12), 1243. doi:10.1001/jamadermatol.2017.4280

Oliveria, S. A., Heneghan, M. K., Cushman, L. F., Ughetta, E. A., & Halpern, A. C. (2011). Skin cancer screening by dermatologists, family practitioners, and internists. *Archives of Dermatology, 147*(1), 39. doi:10.1001/archdermatol.2010.414

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2013). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533-544. doi:10.1007/s10488-013-0528-y

Park, J., Erikson, C., Han, X., & Iyer, P. (2018). Are state telehealth policies associated with the use of telehealth services among underserved populations? *Health Affairs, 37*(12), 2060-2068. doi:10.1377/hlthaff.2018.05101

Pathipati, A. S., Lee, L., & Armstrong, A. W. (2011). Health-care delivery methods in teledermatology: Consultative, triage and direct-care models. *Journal of Telemedicine and Telecare, 17*(4), 214-216. doi:10.1258/jtt.2010.010002

Peracca, S. B., Jackson, G. L., Weinstock, M. A., & Oh, D. H. (2019). Implementation of teledermatology: Theory and practice. *Current Dermatology Reports, 8*(2), 35-45. doi:10.1007/s13671-019-0252-2

Potter, A. J., Ward, M. M., Natafgi, N., Ullrich, F., MacKinney, A. C., Bell, A. L., & Mueller, K. J. (2016, Summer). Perceptions of the benefits of telemedicine in rural communities. *Perceptions of Health Information Management*. Retrieved from http://perspectives.ahima.org/perceptions-of-the-benefits-of-telemedicine-in-rural-communities/

Player, M., O'Bryan, E., Sederstrom, E., Pinckney, J., & Diaz, V. (2018). Electronic visits for common acute conditions: Evaluation of a recently established program. *Health Affairs, 37*(12), 2024-2030. doi:10.1377/hlthaff.2018.05122

Raugi, G. J., Nelson, W., Miethke, M., Boyd, M., Markham, C., Dougall, B., . . . Comer, T. (2016). Teledermatology implementation in a VHA secondary treatment facility improves access to face-to-face care. *Telemedicine and E-Health, 22*(1), 12-17. doi:10.1089/tmj.2015.0036

Rogers, H. W., Weinstock, M. A., Feldman, S. R., & Coldiron, B. M. (2015). Incidence estimate of nonmelanoma skin cancer (Keratinocyte Carcinomas) in the US Population, 2012. *JAMA Dermatology, 151*(10), 1081. doi:10.1001/jamadermatol.2015.1187

Rural Health Information Hub. (2020). Evaluation measures for telehealth programs - rhihub toolkit. Retrieved from https://www.ruralhealthinfo.org/toolkits/telehealth/5/evaluation-measures

Shigekawa, E., Fix, M., Corbett, G., Roby, D. H., & Coffman, J. (2018). The current state of telehealth evidence: A rapid review. *Health Affairs, 37*(12), 1975-1982. doi:10.1377/hlthaff.2018.05132

Singh, G. K., & Siahpush, M. (2014). Widening rural–urban disparities in life expectancy, U.S., 1969–2009. *American Journal of Preventive Medicine, 46*(2). doi:10.1016/j.amepre.2013.10.017

Southwest Telehealth Resource Center. (n.d.). Form templates. Retrieved from https://southwesttrc.org/resources/forms

Stratton, D., & Loescher, L. J. (2016). The acceptance of mobile teledermoscopy by primary care nurse practitioners in the state of Arizona. *Journal of the American Association of Nurse Practitioners, 28*(6), 287-293. doi:10.1002/2327-6924.12313

Temi. (2019). Audio to Text Automatic Transcription Service & App. Retrieved from https://www.temi.com/

Thomairy, N. A., Mummaneni, M., Alsalamah, S., Moussa, N., & Coustasse, A. (2015). Use of smartphones in hospitals. *The Health Care Manager, 34*(4), 297-307. doi:10.1097/hcm.0000000000000080

Thomas, L., & Capistrant, G. (2017, February). State telemedicine gaps analysis: Coverage and reimbursement. Retrieved from https://utn.org/resources/downloads/50-state-telemedicine-gaps-analysis-physician-practice-standards-licensure.pdf

University of Mississippi Medical Center. (2017, October 05). UMMC earns national Telehealth Center of Excellence designation. Retrieved from https://www.umc.edu/news/News_Articles/2017/October/ummc-designated-as-national-telehealth-center-of-excellence.html

U.S. Department of Health and Human Services. (2016, March 27). Text version of Office of Human Research Protection decision charts. Retrieved from https://www.hhs.gov/ohrp/regulations-and-policy/decision-trees-text-version/index.html#ch01

U.S. Department of Veterans Affairs. (2018, December 27). Veterans Health Administration. Retrieved from https://www.va.gov/health/

Valerio, M. A., Rodriguez, N., Winkler, P., Lopez, J., Dennison, M., Liang, Y., & Turner, B. J. (2016). Comparing two sampling methods to engage hard-to-reach communities in research priority setting. *BMC Medical Research Methodology, 16*(1). doi:10.1186/s12874-016-0242-z

Viola, K. V., Tolpinrud, W. L., Gross, C. P., Kirsner, R. S., Imaeda, S., & Federman, D. G. (2011). Outcomes of referral to dermatology for suspicious lesions. *Archives of Dermatology, 147*(5), 556-560. doi:10.1001/archdermatol.2011.108

Wang, M., Gendreau, J. L., Gemelas, J., Capulong, D., Lau, C., Mata-Diaz, S., . . . Raugi, G. J. (2017). Diagnosis and management of malignant melanoma in store-and-forward teledermatology. *Telemedicine and E-Health, 23*(11), 877-880. doi:10.1089/tmj.2017.0009

Wang, S. C., Crook, L., Connell, C., & Yadrick, K. (2016). "We need help in the Delta": Barriers to health promotion among older African American men in the Mississippi Delta. *American Journal of Men's Health, 11*(2), 414-425. doi:10.1177/1557988316684472

Warshaw, E. M., Gravely, A. A., & Nelson, D. B. (2015). Reliability of store and forward teledermatology for skin neoplasms. *Journal of the American Academy of Dermatology, 72*(3), 426-435. doi:10.1016/j.jaad.2014.11.001

Warshaw, E. M., Hillman, Y. J., Greer, N. L., Hagel, E. M., Macdonald, R., Rutks, I. R., & Wilt, T. J. (2011). Teledermatology for diagnosis and management of skin conditions: A systematic review. *Journal of the American Academy of Dermatology, 64*(4), 759-772. doi:10.1016/j.jaad.2010.08.026

Weaver, K. E., Geiger, A. M., Lu, L., & Case, L. D. (2012). Rural-urban disparities in health status among US cancer survivors. *Cancer, 119*(5), 1050-1057. doi:10.1002/cncr.27840

Whited, J. D., Warshaw, E. M., Kapur, K., Edison, K. E., Thottapurathu, L., Raju, S., . . . Reda, D. J. (2013). Clinical course outcomes for store and forward teledermatology versus conventional consultation: A randomized trial. *Journal of Telemedicine and Telecare, 19*(4), 197-204. doi:10.1177/1357633x13487116

Williams, G., & Katcher, M. (2003). Primary Care Dermatology Module Nomenclature of Skin Lesions. Retrieved from https://web.pediatrics.wisc.edu/education/derm/text.html

Yim, K. M., Florek, A. G., Oh, D. H., McKoy, K., & Armstrong, A. W. (2018). Teledermatology in the United States: An update in a dynamic era. *Telemedicine and E-Health, 24*(9), 691-697. doi:10.1089/tmj.2017.0253

Yu, J., Mink, P. J., Huckfeldt, P. J., Gildemeister, S., & Abraham, J. M. (2018). Population-level estimates of telemedicine service provision using an all-payer claims database. *Health Affairs, 37*(12), 1931-1939. doi:10.1377/hlthaff.2018.05116

Zahnd, W. E., Goldfarb, J., Scaife, S. L., & Francis, M. L. (2010). Rural-urban differences in behaviors to prevent skin cancer: An analysis of the Health Information National Trends Survey. *Journal of the American Academy of Dermatology, 62*(6), 950-956. doi:10.1016/j.jaad.2009.08.058

Zhang, D., Wang, G., Zhu, W., Thapa, J. R., Switzer, J. A., Hess, D. C., . . . Ritchey, M. D. (2018). Expansion of telestroke services improves quality of care provided in super rural areas. *Health Affairs, 37*(12), 2005-2013. doi:10.1377/hlthaff.2018.05089