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Title of Dissertation: **UNDERSTANDING SMALL PRIMARY CARE PRACTICE PHYSICIANS' PERSPECTIVES ON ELECTRONIC HEALTH RECORD SYSTEM DECISIONS AND IMPLEMENTATION, PRACTICE IMPACTS AND MEANINGFUL USE: A QUALITATIVE STUDY**

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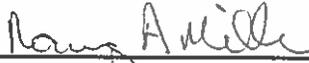
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ABSTRACT

Title of Document: UNDERSTANDING SMALL PRIMARY CARE PRACTICE PHYSICIANS' PERSPECTIVES ON ELECTRONIC HEALTH RECORD SYSTEM DECISIONS AND IMPLEMENTATION, PRACTICE IMPACTS AND MEANINGFUL USE: A QUALITATIVE STUDY

       Deborah L. Crandall, Ph.D. 2017

Directed By: Nancy A. Miller, M.A., Ph.D., Public Policy

Purpose: The Department of Health and Human Services developed the Meaningful Use Incentive Program with the goal of having physicians and hospitals incorporate electronic health record systems (EHRs) in their practice to improve care, gather data, and spur interoperability among providers. Primary care practices with 10 or fewer primary care providers have been impacted by these federal regulations. Small practice groups lagged behind in Meaningful Use participation at the inception of the program and their perspectives are not well known.

Methods: An interview guide was developed after literature review and in-depth semi-structured interviews were conducted with primary care physician (PCP) practices in Maryland consisting of 10 or fewer PCPs. The interviews were with a diverse sampling of PCPs who were identified through various physician group affiliations and referrals until thematic saturation occurred. The interviews were transcribed, reviewed and thematically coded.

Results: Eleven interviews were conducted with primary care practices in the state of Maryland. Themes, such as similar impacts on practices and patient care after utilization of EHRs under the Meaningful Use requirements and variable interoperability emerged. There was positive feedback for EHRs generally that had been utilized prior to the Meaningful Use program. Concerns included unnecessary/redundant data collection, physician penalties based on patient behaviors, preventable and unexpected cost expenditures and time spent in complying with the program, and a flatline impact on patient care. Barriers to participation or continued participation included limited resources (time and cost), patient compliance, distrust of why data were collected, and frustration with changing program requirements.

Conclusion: The majority of PCPs responded that patient care was not positively impacted by the program. Respondents struggled with the patient portal and secure direct electronic messaging with other providers requirements due to patient behavior being beyond their control. Most concluded that interoperability was not possible in the near future so long as there was limited standardization within the EHR industry. Physicians recognized the utility of EHRs in their practices when the software was customized to their practice rather than imposed by regulatory requirements that were time-consuming and often inapplicable to their practices. Federal programs meant to improve care may be perceived as burdensome to physicians and could negatively impact patient care. Although this study is exploratory, it revealed areas for further research that policy makers should consider such as the impact of regulations on small primary care practice physicians' ability to deliver the best care possible.

Requiring compliance with multiple federal programs and imposing physician penalties could impact physician satisfaction and may not be the optimal method to obtain the health policy goals of reducing costs and improving care. Finally, interoperability may be premature for the health care market, particularly for small practices due to inconsistencies with EHR technologies.

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AND IMPLEMENTATION, PRACTICE IMPACTS AND MEANINGFUL USE: A
QUALITATIVE STUDY

By

Deborah L. Crandall

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, Baltimore County, in partial fulfillment
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Dedication

I dedicate this to my family who I love dearly. I thank my parents for their continued support throughout this long process. I thank my number one fan, my Mom, for all her positive words, who continues to amaze me. This dissertation and my career in the health field would not have been possible without the influence of my Dad, who is a continuing inspiration to me on my life's path. I only wish he was still here to see the fruition of this research that we discussed at length, even up until July 1, 2016. I thank my brother, Ken, for his continued words of support and humour that always came at the right time and got me through all the difficult days. I also thank my niece, Morgan, a gifted and intelligent individual and role model for me. Her words of motivation meant so much. Finally, to Jack, my dog, who has been with me every step of the way, providing emotional support and overwhelming love throughout the arduous process.

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Chapter 1: Introduction

"It's not about technology, it's about delivering better [patient] care." This statement was made by Ashish Jha, M.D., Professor of Health Policy and Management at Harvard University's School of Public Health, at the August 7, 2014, "Health Information Technology in the United States: Progress and Challenges Ahead, 2014," policy meeting in Washington, D.C. Current U.S. health care policy, arguably driven by the Health Care and Education Reconciliation Act and the Patient Protection and Affordable Care Act (the two commonly referred to as the ACA), involves improving population health, health care quality – and, thereby, health outcomes – and decreasing the costs of health care delivery (Pub.L. 111–152, 124 Stat. 1029; Pub.L. 111-148, 124 Stat. 119).

In 2011, the Office for the National Coordinator of Health Information Technology (ONC) published the Federal Health Information Technology Strategic Plan 2011-2015 ("Plan") ("Federal Health IT Strategic Plan," n.d.). The first goal of the Plan is to "achieve adoption and information exchange through meaningful use of health information technology" ("Plan," n.d., p. 8). Through designated provider incentive programs, as authorized under the 2009 Health Information Technology for Economic and Clinical Health Act, also known as the HITECH Act ("Meaningful Use Incentive Programs," n.d.), implementation and utilization of electronic health record (EHR) systems with health information exchange capabilities have increased among providers and hospitals; however, small physician practices have not implemented EHR systems at the same rate as large providers ("EHR Incentive Programs," n.d.; Rao, et al., 2011).

One mechanism developed by the federal government to achieve the Plan goal was the introduction of the Medicare and Medicaid Meaningful Use Incentive programs administered through the Centers for Medicare and Medicaid Services (CMS) ("EHR Incentive Programs," n.d.). These programs are meant to "provide financial incentives [to participants] for the 'meaningful use' of certified EHR technology to improve patient care" ("EHR Incentive Programs," n.d.). Designated "eligible providers" and "eligible hospitals" must participate in this program if they serve Medicaid and/or Medicare patients ("EHR Incentive Programs," n.d.). In order to receive monetary incentives, participants must achieve specified objectives in three separate stages. Additionally, if they do not meet the requirements, they are subject to monetary penalties ("Payment Adjustment Hardship Exception," n.d.).

However, participation requires that providers and hospitals implement EHR technologies that are capable of meeting Meaningful Use requirements. Many providers have basic EHR systems that do not meet these requirements (Furukawa, et al., 2014). A basic EHR system is defined as one that can record patient history and demographic information, record clinical notes, record medication and allergy lists, maintain patient problem lists, view imaging reports and has computerized prescription ordering capability (DesRoches, et al., 2008).

At Stage 1, eligible providers must report on a total of 20 Meaningful Use measures ("Meaningful Use Incentive Programs," n.d.). Measures range from recording and charting changes in patient vital signs to using computerized order entry for medications. In Stage 2, many of the Stage 1 objectives have increased (although some were combined or eliminated) ("Stage 2 Overview Tip Sheet," 2012). In 2018, all

providers will be required to participate in Stage 3 regardless of prior participation ("EHR Incentive Programs for Eligible Professionals: What You Need to Know for 2016 Tip Sheet," 2016). The goals of the program include improved care and health outcomes ("EHR Programs: Participation Has Increased, but Action Needed to Achieve Goals," 2014). There is both a mandated certification process for EHR systems and an attestation process for providers and hospitals participating in these programs ("EHR Incentives Registration/Attestation," n.d.). In 2011, there were well over two hundred certified EHR systems listed on the government Office for the National Coordinator of Health IT website; the list has grown significantly throughout the three stages of the Meaningful Use program, providing eligible hospitals and providers arguably overwhelming choices for EHR systems ("Certified Health IT Product List," n.d.). "Medicare eligible professionals who do not meet the requirements for meaningful use by 2015 and in each subsequent year are subject to payment adjustments to their Medicare reimbursements that start at 1% per year, up to a maximum 5% annual adjustment" ("An Introduction to the Medicare EHR Incentive Program for Eligible Professionals," n.d.).

The amount of incentives an eligible provider under the Medicare Meaningful Use Incentive program may receive is based on the year the provider participates in the program and whether the provider is successful in meeting program criteria at each stage. If a provider began in 2011 or 2012, successfully attests and meets all stage requirements throughout all stages each year through 2016, the practice could receive a maximum of 75% of all Medicare allowed charges or $44,000, whichever is less. That amount decreases to $39,000 if beginning the program in 2013 and $24,000 if beginning the program in 2014 (or 75% of all Medicare allowed charges, whichever is less).

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The Department of Health and Human Services (HHS) has announced success with the implementation of EHRs with eligible providers and eligible hospitals (HHS Press Release, 2012). However, Centers for Disease Control and Prevention data indicate there is a lag in the adoption rate of EHR systems with small physician practices – defined herein as practices with 10 or fewer physicians – that either have not implemented an EHR system or have implemented a system but the system fails to meet Meaningful Use requirements (Jamoom, et al., 2012). In 2011, an average of 50.3% of physicians of all specialties in small group practices with 10 or fewer physicians had adopted EHR systems they believed to meet Meaningful Use requirements as compared to 86% of physician practices with 11 or more physicians (Jamoom, et al., 2012). (Note that this research does not stratify the physician practices by specialty.)   In 2013, the percentage of Maryland office-based physicians (regardless of practice size) who had an EHR system that met the basic system criteria was 37.1%, which was below the national average of 48% (Hsiao & Hing, 2014). In 2014, that percentage increased to 75.7% and the national average was 74.1% (Jamoom, et al., 2016). Again, a basic system does not meet Meaningful Use requirements. According to data in the 2012 American Medical Association Physician Master File, 65.6% of U.S. physicians are in firms with 10 or fewer physicians ("Physicians' Foundation Survey," 2012). In 2016, that percentage has decreased to 57.8% ("Physicians' Foundation Survey," 2016). In 2015, research indicated that 86.9% of physicians (practice size not considered) had adopted "any EHR" system and that 77.9% had adopted an EHR certified by HHS (Jamoom, 2015). Also in 2015, 38.6% of Maryland office-based physicians (any size practice) had electronically sent patient information to other providers (an objective in all stages of Meaningful Use);

the national average was 38.2% (Jamoom, 2016). Additionally, the research is mixed as to whether patient care is improving as a result of EHR implementation (Shekelle & Jones, 2014).

Health care reform appears to be increasing the rate at which small practice physicians are moving to larger practices and physician practices are being purchased by hospitals (Burns, et al., 2013: Casalino, 2014). Data suggest that the number of physicians that are leaving their independent practices to become employees continues to increase (Kane, 2015). Kane sees this trend continuing as 2016 data indicates that 47.1% of practicing physicians own their own practice (which is 6% lower than in 2012), although the majority of physicians (57.8%) still work in small practices. In terms of practice size, the small practice consisting of 10 or fewer physicians has also decreased, from 61% in 2012 to 57.8% in 2016; 47.6% of family practice physicians own their practice (citing the "Physicians' Foundations Survey," 2016).

Although the number of independent small practices is decreasing, policy makers should not disregard feedback from this population of providers. Health care cost reduction remains a dominant health policy issue. Policy makers struggle to develop regulations aimed at cost containment. Current quality incentive programs appear to be designed so that larger organizations can maximize incentives and smaller practices are disadvantaged. Research about the performance of hospital-owned practices or about small and medium sized practices is limited. However, a 2014 study indicated that practices with 1-2 physicians had 33% fewer preventable admissions than practices with 10-19 physicians and that practices with 3-9 physicians had 27% fewer preventable admissions. Additionally, 1-2 and 3-9 size physician practices equaled or exceeded the

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national average for practices of all sizes, and hospital-owned small to medium size practices had higher rates of preventable admissions when compared to practices owned by physicians (Casalino, et al., 2014). A 2017 study used the same data to examine the relationship between physician-owned and hospital-owned practices in relation to spending and utilization of care and found that patients linked to hospital-based practices had 7.3% more emergency room visits and 6.4% higher total spending compared to patients from practices owned by physicians. Ninety-five percent of the physicians in the study were primary care physicians (Pesko, et al., 2017). Other studies also indicate practices owned by hospitals are associated with higher spending per patient (McWilliams, et al., 2013; Baker, et al., 2014; Robinson & Miller, 2014; Capps, et al., 2015; Neprash, et al., 2015). As physician practices are increasingly purchased by hospitals, higher total spending may result.

Rationale for Study

This study was undertaken because qualitative research is limited on the impacts of health information technology (IT) on small physician practices (and physician practices generally). A gap exists in the health IT implementation literature where the perspectives of small practice physicians are not well known, particularly small primary care practices. The available literature has focused on collecting survey data in finite question sets with limited opportunity for open-ended responses. Quantitative research has been conducted on health information technology (HIT) functionality generally and Meaningful Use functionality specifically in a variety of health care settings (Shekelle & Jones, 2014). A number of statistical surveys have been submitted to health care providers regarding EHR implementation; however, there has been limited qualitative

research conducted with physicians to provide insight on opinions and detailed reasons for the slow adoption rates among small providers ("Health IT Tools and Resources," 2013).

The United States Government Accountability Office (GAO) released a report in March 2014, entitled "Electronic Health Record Programs: Participation has Increased, but Action Needed to Achieve Goals, Including Improved Quality of Care," which states:

> "Participation in CMS's EHR programs increased substantially from 2011 to 2012, but some providers who participated in 2011 did not continue in 2012. It is difficult to estimate future participation in the EHR programs because of various program changes, including the planned increase in stringency of the meaningful use measures, the introduction of penalties for some providers in 2015, CMS's efforts to increase participation among certain providers, and changes to eligibility requirements" ("Electronic Health Record Programs," 2014)

Rationale for Qualitative Research Methods

A January 2014 report showed that a primary barrier to adoption and use of EHRs is provider "dissatisfaction" (Shekelle & Jones, 2014). Additionally, the researchers state: "An even more pervasive limitation is the lack of reporting about key elements of context and implementation of health IT, regardless of study design. This limitation was noted in Chaudhry's review, and despite calls then and since for better reporting on context and implementation, and even suggestions for specific items to report on, **we still find that crucial elements of context and implementation are missing from the majority of published health IT studies** [emphasis added].

"For example, understanding an organization's financial context,

in terms of its mix of payers and the competitiveness of the local health care

marketplace, is crucial to understanding the business case for health IT and its

potential effects on efficiency and health care costs. Yet this information was

missing from the vast majority of studies. Similarly, reporting on key

implementation items such as how much and what kind of staff education and

training were performed, the use of local champions and helpdesk support are

crucial to understanding 'how to make it work.' Yet again, most of this

information was missing from the majority of articles, making it difficult to

differentiate between lack of success due to failures in concept and lack of

success due to failures in implementation" (Shekelle & Jones, 2014).

Although this study was qualitative and the results are, therefore, not

generalizable to all small primary care physician practices, its design uncovered patterns

concerning EHR implementation gaps that Shekelle and Jones emphasize which could

provide important data for additional large scale mixed methods research. A goal of this

study was to focus on qualitative findings in order to gain an in-depth understanding of

this physician subpopulation's perspectives on practice implications of EHR

implementation. This research adds knowledge about this group of providers who are an

integral part of a patient's continuum of care. Through qualitative analysis insight is

provided into stakeholder experiences, expectations and perceptions and the likelihood of

continued/future participation in similar incentive programs from small primary care

physician practices that have participated in Meaningful Use. These data provide insights

that could be useful in redirecting policy initiatives that focus on improved mechanisms

to reduce EHR adoption barriers, alter provider perceptions and/or increase participation in EHR system implementation and interoperability by this subpopulation of providers.

Additionally, this study provides information to health services researchers, health care providers, and policy makers to better understand the needs and motivations of small primary care practice physicians as opposed to hospitals and large group practices. "[U]nderstanding what is holding back the physicians who have not yet adopted a basic EHR is critically important." (Furukawa, et al., 2014). Although this research looks at physicians who have had EHR systems in place for a minimum of one year, insight into motivations for purchasing the EHRs and what factors may have delayed their implementation decisions emerge. This research also sheds light on other topics which should be researched further in the future (e.g., the use of physician penalties based on patient outcomes and clinical quality measures). Additionally, this study provides insight and information for future researchers who are interested in qualitative data related to health IT use. This research was conducted shortly after the passage of Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) in April 2015, the specifics of which were not addressed with the respondents during the interviews. However, they were asked about new regulatory programs, generally, and the Meaningful Use program, specifically, and this research provides important insights from the perspective of small primary care practices as Meaningful Use is revised and merged into MACRA.

The literature review is summarized in Chapter 2 and covers research topics related to EHR user satisfaction, EHR patient care/health outcomes impacts, EHR costs and time impacts. Chapter 3 describes the problem statement and research question. The research design and methodology are discussed in Chapter 4, including data collection

and analysis procedures. Chapter 5 includes a discussion of the results of the research by the themes of the value of EHRs, patient care impacts, practice impacts, other issues, new program recommendations and interoperability. A discussion of the research, including areas for future research and policy implications, is included in Chapter 6, as well as the conclusion.

Chapter 2: Literature Review

Since the Meaningful Use incentive programs began in 2010, this literature review primarily focused on health IT studies from 2010 forward. However, some relevant research conducted prior to 2010 was evaluated and utilized as necessary to support the rationale for the study.

The body of research on health IT is extensive and continues to grow. This review focused on the health IT research in the ambulatory care setting generally because research focusing on physician practices in the United States is not as robust (but continues to grow), and is particularly limited on health IT's impact on the small provider practice (10 physicians or fewer). Rao and colleagues' study is one of the few studies that identified small practice physician concerns with EHR implementation; that study was conducted using a mailed survey to 5,000 physicians, including both primary care and specialty clinicians, with a response rate of 62% (Rao, et al., 2011). Studies that pertained to patient and provider satisfaction, health outcomes and practice management - such as impacts on practice efficiency and timeliness - were selected. Research on provider satisfaction with EHRs generally is limited, but increasing. Some physician user satisfaction studies with EHRs have involved national surveys, not specifically focused on the small practice physician (Shanafelt, et al., 2016; Colligan, et al., 2016). Another study involving physician professional satisfaction generally, found physician dissatisfaction with EHR usability (Colligan, et al., 2016). Other user satisfaction research involved physician satisfaction with a particular EHR-based clinical decision support (CDS) tool (Heselmans, et al., 2012; O'Connor, et al., 2011; Tang, et al., 2012). CDS is software utilized by an EHR system which assists the clinician in tracking and

managing the health of a patient based on his or her health condition. Note that

Meaningful Use incentive program reporting requirements only require subsets of EHR

functionality, such as recording patient demographics and vital signs, maintaining active

medication allergy lists, recording adult smoking status and implementing system

safeguards to protect privacy and security of patient data. The research thus far does not

focus on these finite limited Meaningful Use requirements but rather covers more in-

depth CDS functionalities used for managing particular patient conditions, such as

diabetes and hypertension.   Research (particularly qualitative) of physician satisfaction

with EHRs that focuses on the small primary care physician practice (ten or fewer

physicians) is limited.

Small Practice Physicians and EHRs

In addition to the Rao study, five other studies addressed small physician

practices in relation to EHRs. A mixed qualitative and quantitative 2010 study focused

on small to medium sized primary care practices with 20 or fewer clinicians and potential

barriers and facilitators to adopting EHRs; the focus was on health information exchange

(HIE) and the majority of practices stated that exchange of tests was the most desired

function and HIE-generated quality reporting was the least desired (Ross, et al., 2009).

Another study related to HIE was conducted by The National Committee for Quality

Assurance. Technical assistance support programs were surveyed, such as Regional

Health Information Technology Centers; then program leaders were convened to discuss

barriers to EHR adoption in practices of ten or fewer primary care physicians (Torda, et

al., 2010). The Torda et al. study found that customized technical support for practices

implementing EHRs has shown promise but funding at the time of the study was limited for continuation for such technical support programs.

Research in 2013 studied the impact of work burdens on EHR use in seven small community-based primary care practices (six or fewer physicians). The research was qualitative and involved observation over a nine to fourteen day period with informal interviews. Results indicated that EHRs reduced some clinician work (such as communication within the office) but increased other work (such as chronic disease and preventive care tasks) (Howard, et al., 2012). This study did not evaluate the work in the context of the Meaningful Use program requirements. Two qualitative studies evaluated barriers to EHR implementation in the small physician practice. The first study was a multi-case study involving 16 office-based small primary care practices of seven or fewer physicians and was conducted to increase understanding of physician perceptions regarding the value of EHRs. The sample included eight offices that had adopted EHRs and eight offices that were non-adopters or partial adopters. Study results indicated that implementation costs, fear of reduced productivity and revenue, usability, lack of interoperability, privacy concerns and workflow interruptions were barriers to EHR implementation and use (Meigs, et al., 2016). The second study used surveys to examine the potential effect of EHR adoption on revenue, unintended costs or savings and changes in patient encounters. The study involved fifteen multi-specialty practices of four or fewer clinicians. The two primary concerns that emerged were a decrease in face-to-face patient time and a decrease in patient volume; other concerns related to increased costs and small practices being forced out of business (Sines, et al., 2017).

Although not research that focused specifically on small physician practices (but included them), a 2013 study examined factors affecting physician satisfaction and their impacts on patient care. One section of the research was on EHRs and included quantitative and qualitative evaluation of physician perspectives. The quantitative findings indicated that there was an association between physician satisfaction with EHRs and overall professional satisfaction; qualitative findings found that physicians experienced problems with increased documentation time, interference with face-to-face patient care, barriers to HIE and impediments to clinical workflow (Friedberg, et al., 2013).

EHR User Satisfaction

Policymakers who developed the Meaningful Use program are concerned with provider and patient satisfaction with EHRs. Thus far, research in ambulatory settings has had mixed findings. For example, one study which had mixed positive results used electronic tools to assist with counseling and managing overweight patients.

In this randomized controlled trial, physicians reported the documentation tools provided in the CDS improved the effectiveness of patient counseling, but the utilization time was counterproductive (Tang, et al., 2012). A majority of 39 primary care physicians (in Belgium) reported positively one year after the implementation of an EHR system CDS tool. This research was quantitative and qualitative; the former involved data collection of recorded computer user interactions over a three month period and a convenience sample of physicians who filled out a short questionnaire to gather qualitative information (Heselmans, et al., 2012). A randomized trial involving 11 primary care clinics had mixed results when control groups showed significant

improvement in systolic blood pressure control after implementation of a CDS tool to manage patients with diabetes. However, diastolic blood pressure and low-density lipoprotein cholesterol measurements were not significantly improved (O'Connor, et al., 2011). CDS depression management software was used in a cohort study involving 19 primary care practices for one year from 2007 to 2008. Providers reported an increased use of the standardized tools for diagnosis and monitoring of depression, however, a majority of clinicians did not utilize the tool for patient education (Gill, et al., 2012). None of these studies explored overall physician and staff satisfaction of utilizing EHR systems in their practices and few utilized qualitative methods, other than surveys.

Two studies were reviewed which reported on clinician satisfaction with EHRs. Zandieh et al. explored satisfaction utilizing a survey with old versus new EHRs and the transition process. Six academic-affiliated ambulatory care clinics were studied from 2006 to 2008. Among 306 ambulatory care providers, 56% of providers were satisfied with their old EHR, 64% with the new EHR, and 58% with the transition process from old to new EHR. Providers were neutral or less satisfied with clinical task functionalities with their new systems (Zandieh, et al., 2012). The second study involved one academic ambulatory care clinic of 28 practitioners in which e-prescribing provider and patient satisfaction were assessed by recording the number and nature of after-hours telephone calls over a period of one year after e-prescribing was implemented. Satisfaction studies of patients and providers were also conducted in which both providers and patients had high satisfaction ratings for e-prescribing. After one year, the overall rate of after-hours calls was reduced to 22% from baseline, although paradoxically overall medication calls significantly increased (Duffy, et al., 2010).

A 2014 national survey of physicians across all specialties was utilized for a multivariate study measuring physician burnout as a result of using EHRs and CPOE (computerized physician order entry). Of 6375 physicians who responded, 84.5% used EHRs; 5872 of those physicians stated that CPOE was relevant to their practice and 82.5% of those used CPOE. The study found that physicians who used EHRs and CPOE had higher rates of professional burnout and the time spent on clerical tasks related to electronic usage lowered physician satisfaction (Shanafelt, et al., 2016). In 2015, thirty-eight physicians from four states were interviewed for a qualitative study that looked at physician satisfaction generally. In that study, Meaningful Use, EHR usability and desk work were brought up as areas of dissatisfaction twice as frequently as any other area; Meaningful Use patient portals were cited as time burdens and interfered with the needs of the patient (Colligan, et al., 2016).

Additional health IT research reviewed related to patient satisfaction and included a clinical efficacy trial involving 11 primary care practices where patient education on hypertension was provided utilizing a touch-screen tablet. Patient satisfaction was shown to be high with the education interface (Neafsey, et al., 2011). It should be noted that this tool was utilized to save the physician's time by reducing their need to instruct the patient on drug efficacy and other prescription information. This could be beneficial for the provider, but not necessarily for the patient who may prefer more face-to-face time. Establishing patient portals, a web portal created by the provider where patients can securely access their health data, is part of the Meaningful Use program requirements. One randomized controlled trial conducted in eight ambulatory practices, found that 83% of patients found the portal valuable for wellness and preventive care use (Nagykaldi, et

al., 2012). By contrast, the Wagner et al. study – also a randomized controlled trial -

found that patient access to their personal health record (PHR) did not result in significant

increases in patient satisfaction and only 25% of those who accessed their PHRs did so

frequently (Wagner, et al., 2013). Again, this research evaluates user satisfaction with a

specific EHR functionality and does not examine the EHR's overall practice and patient

impacts.

Impact on Patient Care – Health Outcomes

Research that evaluated the impact of CDS tools on health outcomes was also

reviewed and the focus remained on research in ambulatory care settings.   Studies

included CDS alert/reminder tools for both the clinician and patient, to monitor alcohol

use, blood pressure and glucose level management for diabetic patients, blood pressure

management in community health centers and heart-related event monitoring. The

alcohol use research occurred at a Veterans Affairs medical clinic and involved electronic

prompts for the physician to remind him or her to counsel a patient who had a history of

alcohol abuse during clinic visits. Access to the clinical reminder did not significantly

impact a patient's drinking and the availability of the reminder did not, without other

influences, result in substantial use of the reminder by the practitioner (Williams, et al.,

2010). The study by O'Connor and colleagues (reviewed in the "satisfaction" section

above) was also considered as it related to patient care and had mixed results; systolic

blood pressure showed significant improvement after implementation of a CDS tool to

manage patients with Type 2 diabetes, but diastolic blood pressure and low-density

lipoprotein cholesterol measurements were not significantly improved. The CDS system

utilized by the physicians had a series of reminders for the provider to use during

appointments with the patients (O'Connor, et al., 2011). A positive results study

involved blood pressure management in four community health centers which utilized a

blood pressure alert and clinical reminders CDS tool; the tool was found to significantly

improve blood pressure control (Shelley, et al., 2011).

Other studies targeted patient interventions by using EHR-based electronic

reminders and the results were mixed or positive. The O'Connor et al. study issued

reminders to patients through mobile applications that were enabled through the

clinician's EHR system (O'Connor, et al., 2011), with mixed results as discussed above.

Another study, involving primary care clinics, utilized mobile technology to personalize

behavioral interventions through a patient's mobile phone for blood glucose control.

Diabetic patients who received the mobile coaching found their hemoglobin A1c levels

significantly decreased when compared to the control group (Quinn, et al., 2011). The

Neafsey et al. study tailored patient education through patients utilizing touch screen

tablets to answer questionnaires and was shown to significantly increase patients'

knowledge of self-medication impacts for hypertension (Neafsey, et al., 2011).

Patient access to personal health information portals via their physician's EHR

systems also had mixed results in health outcomes. The Wagner et al. study

demonstrated that active patient use of the patient portal resulted in a 5.25 point decrease

in diastolic blood pressure, however, only 25% of study participants consistently accessed

their information through the portal (Wagner, et al., 2012). Another randomized

controlled trial involving online patient engagement through personal health record

portals to manage diabetes, found patients experienced greater decreases in their HbA1c

level at the 6 month period, but these results were not sustainable over a year (Tang, et

al., 2012). A descriptive quantitative study involving patients with diabetes which

allowed patients to access their records electronically resulted in increased blood glucose

level testing (Tenforde, et al., 2012).

There are limited studies that involve multiple health IT interventions on health

outcomes. One Canadian randomized controlled trial across 49 community-based

primary care physician practices utilized a vascular risk CDS system.   The CDS

intervention included electronic vascular risk monitoring and treatment advice tailored to

the patient which was shared between the physician and patient, along with quantitative

risk assessment and other clinical resources.   Intervention patients reported improved

continuity of care and vascular health ratings, however, actual clinical outcomes were not

improved (Holbrook, et al., 2011).

However, Virga and colleagues found that the establishment of heath information

exchange among EHRs in three clinics was associated with significant improvement in

health outcomes among HIV/AIDS patients (Virga, et al., 2012). A pre-post study that

included 34 primary care practices in a single healthcare system reported significant

improvements in diabetic patients' health outcomes across several different health

outcome measures after EHR implementation (Herrin, et al., 2012). The size of the

primary care practice was not considered in the analysis.

Costs

The literature review also encompassed research related to patient care efficiency

as a result of health IT utilization. Prior literature reviews by researchers concluded that

health IT cost impacts of health IT were limited (Buntin, et al., 2011; Chaudhry, et al.,

2006; Goldzweig, et al., 2009).   Evidence remains sparse that establishes a relationship

between health IT utilization and healthcare costs in ambulatory care settings (Shekelle & Jones, 2014). One study that involved 200 physicians and EHR usage is particularly insightful in terms of the value of having highly skilled staff. The study was cross-sectional and demonstrated that quality and cost efficiencies improved in ambulatory care settings that had highly trained and autonomous staff versus those care settings where such staff were limited (Adler-Milstein & Jha, 2012). Another descriptive quantitative study involving 49 physician practices demonstrated that the average physician who invested in an EHR system that met Meaningful Use requirements and received the program monetary incentives would lose $43,743.00 over a five year period and only 27% of practices would have a positive return on their EHR investment (Adler-Milstein, et al., 2013).

Time

Policymakers believe EHR utilization will save the practitioner time. Thus far, the research shows results are mixed. In terms of time efficiency, Devine and colleagues found that e-prescribing took 56% more time than writing a prescription in long hand (Devine, et al., 2010). A study evaluating EHR point of care documentation's impact on a nurse's time and nurse patient interaction had mixed results; nurses were able to spend 90% more actual time with patients, but the relative time was less because of prolonged pauses in which the nurse was entering data into the system and not interacting with the patient (Duffy, et al., 2010).

Other research indicates decreased practice efficiencies after physician's EHRs allowed them to access computerized imaging results and this was associated with a 40-70% increase in imaging test orders (McCormick, et al., 2012). Increased utilization was

also found at a Kaiser outpatient facility after personal health record access was adopted. Increased office visits, telephone calls and after-hours visits, emergency room usage and hospitalizations were reported by patients using the personal health record (Palen, et al., 2012). However, another study found a reduction of phone calls by 31% relating to test results after allowing patients access to on-line test results at a city clinic for sexually-transmitted infections (Ling, et al., 2010).

In Wisconsin, 142 family medicine physicians who were part of the same hospital system and utilized an EPIC EHR were analyzed using event logs from data accessed from the EHR system. The study found that clinicians spent almost six hours of each day, before and after clinic hours, interacting with an EHR (Arndt, et al., 2017). Sinsky and colleagues studied how multi-specialty physicians' time was utilized with EHRs in ambulatory care centers using quantitative observational and self-reported diary methods. The research found that for every four hours of direct clinical care physicians spent almost two hours on EHR and desk work within the clinic each day and an additional one to two hours after work on additional computer and clerical work (Sinsky, et al., 2016). A 2017 study that researched the effects of EHRs on work-life balance and burnout among primary care residents and teaching physicians found that respondents who spent more than six hours weekly after hours on EHR tasks were 2.9 times more likely to report burnout and 3.9 times more likely to attribute it to EHR use (Robertson, et al., 2017).

Due to both the complexity of health care and EHR functionalities and the demand for quantitative data in this area, it is understandable that a large portion of the health IT research focus is on finite types of health conditions or specific EHR functionalities. However, this review demonstrates that qualitative data are lacking in

most health IT research that attempts to evaluate the impact of EHRs on small physician

practices and patient care generally, and small primary care physician practices

specifically.

Chapter 3: Research Question

Statement of Problem

Health care costs continue to rise, yet the quality of care in the United States is not as high as the health care in other developed countries (Docteur & Berenson, 2009). The inability of health care providers to track their patient along the continuum of care has added to the high costs of care. Experts contend that if providers could exchange patient information electronically throughout the patient's transitions of care (e.g., from hospital to post-acute care facility to outpatient care) that patients could receive higher quality of care and costs will be reduced.   Thus, the Meaningful Use regulations were enacted to encourage providers to implement electronic health technologies (e.g., EHRs) and to spur the ability of these systems to exchange health information through interoperability. Policy makers envision a nation where every health care provider and institution has the ability to communicate electronically. However, there remain issues with the lack of interoperable system capability and data exchange standards. Therefore, this goal is in its infancy as providers - particularly many small physician practices - only have basic EHR systems or systems which lack interfaces to communicate with other provider EHRs due to variations in EHR technologies.

As the number of small physician practices that have implemented EHRs has increased, some EHR vendors that once had systems certified for Meaningful Use have been decertified, have merged with other IT companies or are no longer in business. Policymakers have surmised that the lag in participation in the Meaningful Use program by small practices may be due to implementation and resource costs, however, there is scant research on the topic. Until there is a greater understanding of the motivations

behind the choice to fully participate in this health information exchange (HIE),

achieving "buy in" from this population of providers (as well as other providers) will be

difficult. The primary care provider **is** a patient's primary health care provider and, often,

their sole care provider. Therefore, this study was conducted to provide insight into their

participation and perceived impact on their practice.

Research Question

Small practices with 10 or fewer physicians have adopted EHR technologies more

slowly due to implementation barriers that differ from practices with 11 or more

physicians. The central research question that this study aims to answer is: What are the

barriers to successful EHR implementation in a small (10 or fewer) primary care

physician practice? Through semi structured qualitative interviews the study probed for

answers utilizing an interview guide (Appendix I).

Chapter 4: Research Design and Methodology

Study Approach

This was a qualitative research study. "Qualitative research is a field of inquiry that crosscuts disciplines and subject matters. Typically, the research questions addressed by qualitative methods are discovery-oriented, descriptive and exploratory in nature. Qualitative researchers aim to gather an in-depth understanding of human behavior and the reasons that govern human behavior. Various aspects of behavior could be based on deeply held values, personal perspectives, experiences and contextual circumstances. Qualitative research investigates the why and how of decision making, not just what, where, and when" ("Qualitative Methods," n.d. p.1). Qualitative research is utilized to understand and explain participant meaning (Morrow & Smith, 2000).

Patient care is complex and EHR implementation is a costly and time-consuming process. Numerous surveys have tried to categorize EHR implementation characteristics. However, "[s]urveys can try to deal with phenomenon and context, but their ability to investigate the context is extremely limited" (Yin, 2009). Therefore, a study that allows a researcher to build a complex picture of a participant that includes detailed views of interviewees is essential. In order to address this gap in the research, the lived experiences of the physicians and staff were collected through semi-structured interviews. Interpretative phenomenological analysis was utilized to identify key themes of the interviewee's experiences (Smith, Flowers & Larkin, 2009). Initially, during the proposal phase, the utilization of the grounded theory approach was the framework that had been planned. Both the phenomenological approach and grounded theory have similar approaches, such as being exploratory, using interpretivist approach to explore

real-life situations, and requiring significant interaction between the researcher and the subject of the research (Parahoo, 2006).   To generate new theory, grounded theory is used for collection, coding, and analysis of social research data (Lowe, et al., 2015). However, grounded theory was not used in this study since the formulation of theory was not sought. The study is exploratory and phenomenological. Phenomenological design is used by researchers to derive new knowledge from participants' perceptions of their lived experiences (Moustakas, 1994). Additionally, the Framework Method was also used as it is not aligned with a particular theoretical framework and is a flexible tool adaptable to many qualitative approaches that are theme-generating, particularly in health research (Gale, et al., 2013).

Overview

The study utilized qualitative techniques to address the research question. A phenomenological approach guided the investigation by seeking to understand patterns or processes, commonalities and differences and extracting them for subsequent analysis (Smith, 2007). The research involved: 1) interviews with physicians and/or staff in private practice settings; 2) mapping the elements which correlated to elements of practice impact and patient care and patient care improvements through coding procedures done individually; and 3) ranking of the elements of practice barriers and patient care improvement using the number of times the same or a related element is stated, involving responses from stakeholder physicians and/or staff. Physician/staff perspectives on EHR's impact on the practice were targeted throughout the data collection and analysis process; staff feedback was gathered in field notes as they are often central to patient satisfaction, care and improvement indicators.   A pilot study was

conducted in 2011 with four primary care physician practices that confirmed the

feasibility of this approach and the likelihood that it would yield valuable results.

This was an exploratory qualitative study of EHR technology's impact on primary

care physicians in small practices. In exploratory research, social phenomena are

investigated and *a priori* expectations are minimized in order to develop explanations of

these phenomena (Lincoln & Guba, 1985). A qualitative method was chosen for an

analysis of themes and concepts as drawn from an exploration of EHR implementation

and technologies' impact on small primary care physician practices as little is known

about this primary care physician population and an in-depth understanding is desired.

Since this new technology process is a personal experience for the stakeholders

and responses will be subjective, interviews were the preferred investigative approach. A

reflexive approach was utilized. Neither patient impact nor patient improvement was

pre-defined, so that the respondent's narrative process revealed these definitions from the

stakeholder's perspective. Since quality is an often-used term in the health care setting,

with differing interpretations and measurements among stakeholders, the term was

avoided in framing the questions, however, if the respondent expressed the term, its

facets were further explored.

Theoretical Framework

The Framework Method involves seven stages: 1) transcription; 2) familiarization

with the interview; 3) coding for patterns and themes; 4) developing a working analytical

framework by grouping codes into categories through several iterations until no

additional codes occur; 5) application of the analytical framework by further labeling and

refinement of codes; 6) charting the data by categories, comparing and contrasting codes

among research participants, and including quotations that are applicable to the categories; and 7) interpreting the data by mapping category connections to explore relationships, and identifying areas that are not functioning well within by a certain system or organization (Gale. et al., 2013).

Conceptual Framework

To provide further analysis of the data, a conceptual framework was also considered. The conceptual framework of this study is based on Christensen's theory of disruption in innovation. This theory has been proposed as a conceptual framework to utilize in understanding the difficulty healthcare entities have with innovation implementation. Christensen's theory proposes that several factors must be aligned and operational for disruptive technologies to become embedded in health care organizations: regulatory reform, suitable business models, inherent technological characteristics and the ability to simplify processes (Christensen, et al., 2009).

EHRs and the Theory of Disruptive Innovation

The disruptive innovation theory can be used to interpret how organizations handle innovation; innovation can either be sustaining or disruptive (Christensen 1997; Christensen and Raynor 2003; Christensen, Anthony, and Roth 2004). An example of sustaining innovation is improvements to existing products, like cell phones with increased functionality. Disruptive innovations are developed when existing technologies are too expensive or complex and, therefore, limit the number of users (Christensen and Raynor 2003; Christensen, Anthony, and Roth 2004). Although EHRs were developed prior to the Meaningful Use program, many had basic functionality based on the software, such as being limited to basic patient charting and billing. In studying the

impact of the Meaningful Use incentive program on physician practices and patient care, this theory was considered during the analysis process.

Subjects/Settings

The primary care physician population of interest consisted of Maryland primary care physicians in medical practices of 10 or fewer physicians ("small practices") that implemented or considered implementing EHR systems pursuant to federal mandates under the HHS Meaningful Use Medicare Incentive program. The primary purpose of sampling was to identify cases that fit the study criteria and could provide more in-depth understanding and clarity of the impact, either positive or negative, of the Meaningful Use program requirements on the physician practice. Purposive sampling was used to develop a list of physician practices for possible inclusion in the study. Because in-depth interviews were being conducted with a small number of offices, purposive sampling was used, as the emphasis was on the quality of the interview and not the quantity of practices contacted. With qualitative research, the objective is to become "saturated" with information on the topic versus maximizing the number of research subjects (Padgett, 1998).

Respondents were selected based on the criteria of being in primary care practice and having an EHR system implemented in the outpatient setting for a minimum of one year. The sample included the following stakeholder groups: primary care physicians; administrative personnel; and direct care staff (i,e., nurses). Information technology personnel were not available for comment and none were employed by any office; they were generally part of the EHR vendor support team, if that support was specified in the EHR purchase contract. Online searches and telephone calls were conducted to obtain

names and telephone numbers and to determine the size of the practice. Once a medical practice was established as fitting the criterion of a small primary care practice, additional calls were made to obtain permission to interview a practice physician or employee responsible for EHR implementation. The primary care physician practice that met the research criteria was the broad level unit of analysis; the narrow level unit of analysis was the individual respondent.

Physicians were recruited through physician associations (the Maryland Academy of Family Physicians), primary care physician conferences, referrals, physicians who responded to public comments pertaining to the Meaningful Use program federal rules, cold calls and other networking strategies.   The study initially was to be comprised of conducting 25 interviews with physicians and staff in primary care practices in Maryland. However, the data from each interview lasted much longer (greater than one hour) than originally anticipated (10-15 minutes) and was rich and descriptive. Thematic saturation was reached during the fifth interview, but six more interviews were conducted to confirm findings and validate thematic saturation (Kuzel, 1999). In phenomenological research "it is less straightforward to identify a role for saturation in qualitative approaches that are based on a biographical or narrative approach to analysis, or that, more generally, include a specific focus on accounts of individual informants." (Smith, 2007).

The practice size breaks were based on 2013 survey data that indicated that physicians in practices of six or more physicians had a 172 - 255% higher probability of adopting a basic EHR than solo physicians; solo practitioners had a 37% basic EHR

adoption rate (Furukawa, et al., 2014). Table 1 shows the practice characteristics related to size and setting.

Table 1

Number of Practices by Physician Size and Setting

Practice Size	No. of Practices	Rural	Urban	Suburban/Rural
Solo Practice	5*	3*	2	
2-5 physicians	4	1	1	2
6-10 physicians	2		2	

*One practice had one physician and one nurse practitioner

An exploration of any possible causal link based on practice size was not identifiable through surveys (Yin, 2009) and a comparison of the perspective and behaviors of these practice sizes was conducted to identify relevant and valuable data. Furukawa and colleagues' research suggested that physician age, region or rural status had little association with EHR adoption. However, practice size, organization (multi-specialty clinics had higher adoption rates) and ownership (practices owned by hospitals or large health care organizations) were strongly associated with EHR implementation (Furukawa, et al., 2014). Therefore, ownership data were collected. Respondents were asked if they saw patients insured by Medicare and Medicaid. All practices saw both, except one practice that did not accept Medicaid patients.

Data Collection Overview

After IRB exemption approval, the research began. Field research consisted of in-depth interviews as the primary data collection method. Data were gathered through semi-structured, face-to-face or telephone interviews. Data collection proceeded more

slowly than planned due to the difficulty of getting physicians or staff members to participate due to time constraints. Physician offices were selected based on meeting the size criterion for the study and type of physician (primary care provider). The physician or office manager was questioned as to which staff member was the most involved in meeting Meaningful Use requirements in the practice and a time was set to interview that individual. In seven practices it was the physician; in four practices it was the office manager (in one practice the office manager was both an office manager and a nurse). Once interview times were agreed upon, however, no appointment was missed or rescheduled. Respondents were very open to discussing their experiences with the Meaningful Use program. Three respondents provided additional names of providers to call to participate in the study. Six physicians who saw primarily Medicaid patients said they would like to participate but simply did not have time, even when the interviewer expressed a willingness to conduct the interview at any time that would be convenient for them. Respondents were cooperative and forthcoming. In summary, seven primary care physicians and four ancillary staff in 11 outpatient practices with 10 or fewer physicians were interviewed regarding their experiences with EHRs, Meaningful Use and its impact on the practice and the patients.

Interviews

The interviews were conducted between December 1, 2015, and June 30, 2016. They were open-ended interviews and were "guided conversations" developed to answer the research question. The selection of interviewees was based on fitting the study parameters as well as their ability to provide the needed information. In order to determine this, a staff member was asked which individual was most responsible for

complying with the Meaningful Use program. All prospective respondents were required to give verbal consent to be interviewed and all participants were over 18 years of age. Respondents were informed about the research and the interview protocols were explained pursuant to IRB principles. Respondents were also assured that no questions would ask for information, including personally identifiable information, about their patients to ensure there would be no privacy and confidentiality violations of their patient population; no specific population was involved and no participant intervention was required. This was a facet of the ethical considerations required for the preparatory phase of research. The research was low or less than minimal risk human subject research, none of the respondents are identifiable, no patients were identified, the information gathered was not private, no confidential personal or patient information was asked for or provided by respondents, no intervention between the respondent and interviewer was required, the data were not about the individual respondent but about an office process elicited from the individual respondent.

One physician or staff member was interviewed from 11 practices. The respondents were selected based on their roles, expertise or experiences with the EHR systems and Meaningful Use program. Respondents included physicians, office managers, and other health care providers (nurses) in the practice. Three respondents served dual roles (e.g., office manager or nurse/office manager who was also in charge of aspects of health IT). Table 2 shows data collected on practice ownership, respondent type (physician(s) or office manager), EHR type, and date of any EHR implementation (basic or certified for Meaningful Use).

Table 2

Characteristics of Responding Primary Care Practices

Practice Identifier	Practice Ownership	Respondent Type	EHR Type	Date of EHR Implementation
P1	Physician (Independent)	Office Manager	SRS	2007
P2	Physician (Independent)	Physician	Chart Logic	2007
P3	Physician (Independent)	Office Manager	Medisoft Clinical	2011
P4	Physician (Independent)	Physician	Amazing Charts	2008
P5	Physician (Independent)	Physician	X*	2009
P6	Physician (Independent)	Office Manager	X*	2009
P7	Physician (Independent)	Physician	GE	2005
P8	Physician (Independent)	Physician	Athena	2014
P9	ACO (Hospital)	Physician	eClinical Works	2011
P10	Physician (Independent)	Office Manager	All-Scripts	2006
P11	Physician (Independent)	Physician	PowerMed eMDs	2003 2013

*The EHR type used by P5 and P6 could lead to practice re-identification and was, therefore, not disclosed herein.

Once a practice was selected by size, agreement from the physician to participate was gathered, whether or not the physician or other staff was determined to be the most appropriate respondent. The physician was asked if any particular staff member had been a primary participant in the EHR decision-making and utilization process (such as a nurse, office manager or IT staff member) and an interview with that individual was requested. The physician was not always determined to be the most appropriate respondent. Then, a time that was convenient for the interviewee was established. If the individual expressed a preference for a telephone or video-conference interview, that was

allowed; however, an office visit was the preferred interview setting. The targeted length

of the interviews was 30 minutes, however, the majority of the interviews extended

beyond that time and continued for as long as the interviewee desired. The possibility for

follow-up interviews, if needed, was requested and a time of interviewee preference

secured at the close of the interview. All participants agreed to the follow-up interview,

if necessary. Consent to be audio recorded during the interview was obtained and the

interviews were recorded.

The researcher conducted one interview with one respondent at 11 different

primary care practices; three interviews were conducted at physician offices (n=3), five

interviews were conducted by telephone (n=5), and three interviews were conducted

during the annual Maryland Academy of Family Practice Conference (n=3). The

interviews were conducted over a period of seven months. All interviews were recorded

and the interviewer took notes during the interview. Field notes were taken prior to and

following the interviews. The interviews lasted approximately one hour. The interview

questions were designed to generate data on the practice's experience with EHRs, the

Meaningful Use program and the program's impact on patient care. Data produced were

categorized; hard copies were filed and digital data were stored on computer and backed

up on external hard drive files which facilitated data analysis and interpretation.

An interview guide was prepared for the study (Appendix I). The prepared

questions were categorized under the following key areas:

- year of EHR implementation,

- participation in the Meaningful Use program,

- requirements of the Meaningful Use program and their impact on the practice, and

- impact of the program on patient care.

The guide allowed the interviews to have some structure, although the interviews were conversational and allowed the respondent to elaborate in other areas relating to the research. Use of the interview guide strategy provides more structure than in the unstructured, solely informal conversational interview, while still allowing flexibility (Patton, 1990, as cited in Rubin & Babbie, 2001). A structured interview aids the researcher in organizing and analyzing interview data.

The researcher explained the purpose of the interview and how the respondent was selected (because of his or her practice area and size of practice or by recommendation and meeting study parameters). The confidentiality statement was reiterated to each respondent when they were informed they may be quoted and that their names would not be disclosed, instead, they would be identified demographically.

Because the design of the study is exploratory, the interviewer probed for more detail, and clarification with certain responses. Field notes written after each interview allowed for additional comments by the interviewer and were also part of the analysis.

When interviews were conducted at physician offices, non-participant observation of actual EHR systems and usage was minimal due to the confidentiality of patient information and HIPAA requirements. Observation was limited to the physical size of the office space and the number of patient files stored within the office space.

The interviews began with open-ended questions to prompt narrative answers. For example, participants were asked, "How has the use of electronic health record

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system in your office impacted patient care?" This approach established rapport and allowed for a free flow narrative response. Probes related to the questions listed above were used throughout the interview to further explore concepts brought up by the respondent related to the research question. A set of questions was used to guide the interview process, however, they were not asked sequentially as is the case in a structured survey type interview. The goal was to understand the impact of EHR systems from the perspective of stakeholders; not presupposing to know what matters to them.

Analysis Strategies

Data Analysis Procedures

A quality audio recording was made as well as a verbatim interview transcription of each interview pursuant to the first stage of the Framework Method (Ritchie & Lewis, 2003). All the audio recordings were transcribed by a third-party transcription service business. The researcher reviewed the content of each transcription while listening to the audio recording. Data analysis was conducted iteratively as the data were collected. The transcripts allowed for data immersion through repeated review, analysis and coding. The audio recordings were also listened to repeatedly and accompanying memos and field notes reviewed for contextual information and interpretation (Ritchie & Lewis, 2003). The analysis involved qualitative analysis of the interview narratives, including searching for themes and patterns in responses. The goal was to understand the personal experiences of the physician/staff and their viewpoint on patient care impacts as a result of EHR implementation. Another goal of the research was that the findings of this research could provide information for further study related to this research question, related policy issues and to explore other related areas for data collection, analysis and

research. Through understanding the respondent's perspective, enhanced decision-making in this area of health policy may result. Information from the "frontlines" of patient care is instrumental in health policy development; day-to-day physician work is impacted (and often impeded) when new technologies are implemented. The goal of the study was to ascertain and accurately represent the range of experiences and expressed insights in EHR implementation and utilization of the small practice primary care physician.

During a three level process (discussed below), data were reduced to themes, subthemes and concepts through coding. Through the process of developing logical associations with the interview data, becoming immersed and intimate with the data, and analyzing the evidence and what was learned during the interview process and review, themes and sub-themes began to emerge. From the data evidence, abstraction of themes at Levels I and II became overarching themes and sub-themes. The themes and sub-themes that emerged became the major findings of the research.

Since qualitative sampling is not random, but usually "purposive" (Kuzel, 1999) the goal was to identify shared patterns and themes across primary care outpatient settings and from the various staff.   A thematic analysis approach was used to analyze the verbatim transcripts (Braun & Clarke, 2006). Atlas.ti, version 8 software was used for data management and analysis. Data collection evolved as the interviews progressed based on concepts expressed by the respondents. The goal of the research was exploratory and to obtain further insight into physician and staff experiences and beliefs regarding practice impacts and patient care improvements as a result of EHR implementation, not hypothesis testing.

Methods and Procedures

The objectives of the study guided the data analysis process which was conducted during the data collection process, as well as after data collection. The inductive approach was used for the analysis of interview transcripts and field notes which allowed for the identification of patterns in the data and thematic codes were developed. "Inductive analysis means that patterns, themes and categories of analysis come from the data; they emerge out of the data rather than being imposed on them prior to data collection and analysis" (Patton, 1980).

This study utilized a phenomenological framework. To derive new knowledge from participants' perceptions of their lived experiences, researchers use a phenomenological design (Moustakas, 1994). From the participants' personal perspectives, phenomenological research leads to the discovery of knowledge based on their personal understanding of the phenomenon (Hodge, et al., 2014). Codes generated from each interview were compared to other interview coding to identify patterns, similarities and differences.

Data Coding

The text-based data were repeatedly reviewed and coded for analysis of recurrent themes. Some codes were anticipated and others were derived as the transcripts were reviewed. Throughout the iterative qualitative analysis process, the researcher adjusted codes as necessary to better fit emerging concepts. Atlas.ti qualitative data analysis software ("Atlas") was used for data management and organization. Atlas was used for assigning open codes and in vivo codes. The researcher also used the notes sections of the software to further expand on coding decision criteria. Themes were identified and

quotations coded as they pertained to various themes. Recurrent patterns and cross-cutting themes were identified and analyzed. Thematic saturation was determined to have occurred when no new thematic categories were discovered with additional interviews. Three levels of coding were performed by the researcher.

Level I Codes

In inductive studies, the Framework Method guides the researcher to utilize more open coding at this stage, "coding anything that might be relevant from as many different perspectives as possible…and looking out for the unexpected" (Gale, et al., 2013). Codes could refer to substantive things, values, emotions and methodological elements (Saldana, 2009). Codes developed at Level I consisted of open codes and in vivo codes which allowed the interview narrative data to be reduced to manageable categories. Approximately 35 open codes were developed by the researcher prior to analysis. Additional open codes were developed as the data were read and analysis involved the assignment of more specific substantive labeling and in vivo codes using respondents' specific words. Quotations were also chosen during this phase of coding. Transcripts were coded line by line. This process resulted in 211 codes which related to the impact of EHRs on the physician's practice and on patient care.

Level II Codes

The Level I codes were examined to identify concepts and to organize patterns that seemed to cluster together and Level II codes were derived through merging and revision of the original codes. The Level II codes identified the impacts, conditions and consequences of the implementation of EHRs, either followed by or in tandem with complying with the requirements of the Meaningful Use program (Strauss & Corbin,

1990). Codes began to be grouped together in categories and the total number of codes was reduced to 93 (Appendix II).

Level III Codes

At the third level, a working analytical framework began to emerge. Some codes became concepts that were created by further merging and connecting Level II codes through the abstraction of the data evidence. Themes and sub-themes were further identified at this stage after the analysis of "selective" codes (Strauss & Corbin, 1990). Codes were labelled with easy identifiers in Atlas for indexing and organizing data in all transcripts. This process is called "applying the analytical framework" which is the fifth step in the Framework Method (Gale, et al. 2013). "Theoretical saturation" occurred during this phase in which additional data failed to uncover any new ideas about the emerging theory resulting in the completion of the coding process (Beck, 1993).

Stage six of the Framework Method involves charting the data into the framework matrix which was generated by the qualitative software. Additionally, data charts and relational attributes were also done on paper for thoroughness and comparison. The charts in the software program also referenced quotations for each group or category.

The final stage of the Framework Method involves data interpretation. This step was aided by analytical memo writing throughout the seven stage process. Characteristics of the data were identified, and differences were also noted. Connections among categories were explored and concepts emerged, such as barriers to the practice and barriers to patient care. "If the data are rich enough, the findings generated through this process can go beyond description of particular cases to…identifying areas that are not functioning well within an organization or system" (Pope, et al., 2000).

Validation was attempted through a rigorous and committed approach in handling the data, instead of triangulation (Yardley, 2000). Data validation was conducted through memoing. Notes were taken of observations, perspectives and interpretation from the field. Techniques for qualitative validation included seeking repetitive information (patterns) and similar themes in responses. Additional review was conducted to attempt to avoid or minimize bias, including interviewee bias, holistic fallacy and elite bias (Miles & Huberman, 1984). Additional checks were used throughout the interview process and in coding and analysis. For example, during the interviews, a conscious attempt was made to avoid phrasing questions in a way that implied that physicians or staff would have negative opinions about some aspects of EHR systems.

All audio-recorded interviews were cross-checked against the transcripts for interpretation issues by repeated listening of the interview. Notes were added for clarification and field notes were referenced to provide additional clarification. Field notes were taken immediately after the interviews. The transcripts were uploaded to Atlas for analysis.

Determinants of reliability are accuracy, whether a researcher's use of codes changes over time, and stability, in which a "gold standard" coding scheme is established from the outset and other coding schemes are developed through analysis and compared to it (Krippendorff, 2004). The researcher coded each transcript at three different times to increase intra-reader reliability. The first review involved utilization of the pre-existing codes and creation of new and in vivo coding. During the transcript review process the coding was repeated anew and the prior coding was compared with the new

coding to establish reliability. Each subsequent re-coding review occurred with at least

two months separating the prior review. Although descriptive and abstract codes

emerged, the codes remained consistent. A demonstration of reliability through stability

occurred when the major codes pre-established before the transcripts were reviewed

remained consistent. For example, beginning codes included cost burdens, staff burdens,

patient time, patient IT usage, EHR usability, provide e-communication, interoperability,

financial penalties, financial incentives, regulations and federal programs; data emerged

that fit in each category and thematic saturation was reached. The result was the

retention of those codes from the pre-coding stage to Level III coding.

A detailed account of the data collection process to establish dependability is

provided for replication in future research. The dependability of a study is achieved

through a systematic description of the data collection so that other researchers are able to

replicate the study in another setting (Moustakas, 1994). Researcher bias was noted at

the outset and checked and re-checked through the data collection and analysis process.

Although bias cannot be eliminated, procedural awareness and checks can minimize its

impact on the research. Additionally, through systematic note-taking, an audit trail was

developed to preserve data integrity. Dependability can be established through mitigating

bias and ensuring the integrity of data (Onwugbuzie & Byers, 2014).

Chapter 5: Results

   All physician practices were located in Maryland. Five were urban settings, four

were rural settings and two were rural/suburban settings. All but one practice served

patients with private insurance, Medicare and Medicaid, although Medicaid patients were

a small percentage of their patient population, with a range of 1.5% to 15%. One practice

served only private insurance and Medicare patients. Five of the practices had one

physician; one of those also had one nurse practitioner. All practices were independently

owned, except one which was part of a hospital system.

Every practice had a different EHR system except for two practices. Of those two

practices, one physician was the developer of the EHR and the other practice served as a

pilot practice for the EHR. Neither of the two practices referred me to the other; that both

practices used the same EHR system was coincidental. The earliest an office had

implemented and EHR was 2003, the latest was 2014

   One individual from each practice was interviewed and consisted of seven

physicians, three office managers and one nurse/office manager. The themes and sub-

themes that emerged from the interviews about EHR impacts and the Meaningful Use

program are described below and summarized in Table 3.

Table 3

Summary of Themes and Subthemes

Themes	Subthemes	Quotes	No. of Respondents Identifying Themes/Subthemes
EHR Factors	1.Before MU EHR had advantages over paper	"...having all the information at their fingertips was life changing as far as access to patient records when they were on call over the weekend or at night, they could have remote access so they always had access to patient information." P1 (Office Manager)	n=9
	2.Post MU Systems updates required	"They were time consuming because every time there was something new or an update to the program and then we also had to… If we had update server, then we had to get IT people involved, so it was time consuming, very much so, yes." P3 (Office Manager)	n=11
	Staff education	"Education. At first, it was understanding the requirement and then giving everyone in the practice the information that they needed in order to facilitate and fulfill the requirements. The doctor actually increased her staff over the last year and a half probably to help her with some of to pick up some of the slack, so we have four and a half employees." P3 (Office Manager)	
	Redundant/irrelevant clinical data collected	"They also want a lot of irrelevant data that you know is in here, questions like do wear a seat-belt, are you smoker." P2 (Physician)	n=11

Table 3 (cont.)

Themes	Subthemes	Quotes	No. of Respondents Identifying Themes/Subthemes
EHR Factors (cont.)	3.MU Stages Stage 2 Complex	"What I have seen with part two is not even not even 30 or 40 have satisfied Meaningful Use part 2 requirements. and with stage 2 nobody has. I don't know of any doctor in town who has met Stage 2." P7 (Physician)	
	Cost burdens	"Well, in the beginning the incentives payments covered the cost. But this past year, we spent more than we were going to get." P3 (Office Manager)	
Patient Care Related	4. Impact on Patient Care		
	Improvement	"I think it's improved it actually. It enables the patient to take something home that tells them about their appointment and reminds them of the changes that were made and… and go online look at the lab results. I think that it has actually helped the patient to be able to be more informed." P3 (Office Manager)	n=1
	No Improvement	"I believe what we're going to see is that Meaningful Use actually worsened care." P5 (Physician)	n=10
	5.Patient Portal		n=11
	Patients prefer to talk to Staff/Physician	"Just to have to badger patients to communicate with us is totally absurd and unreasonable to have that be a job, does not help their care - to force them to interact with us. They call us if they need us." P1 (Office Manager)	

Table 3 (cont.)

Themes	Subthemes	Quotes	No. of Respondents Identifying Themes/Subthemes
Patient Care Related (cont.)	Requires Physician to Control Patient Behavior	"What's really hard is that patients--my way is to print it out, because honestly, they don't necessarily look at it on their portal. It's making me try to change the patient's mind of how they want the information and how they want to use a doctor and the patients aren't there yet." P4 (Physician)	
	6.Eye Contact Can Inhibit Patient/provider interaction Work-arounds: EHR usability Positioning	"It's not exactly my own word but I heard it called 'third person in the room' and its really kind of distraction." P9 (Physician) "[EHR X] is set up specifically to encourage better communication. We made it so simple to use that – and I was extraordinarily careful about making sure that I sit in a way that I can make eye contact with my patients." P5 (Physician) "What I did is I bought over bed tables... so I stand there with my laptop here where I can have eye contact, you know, and try to avoid some of that anyway with patients but still it's very distracting, don't you think?" P8 (Physician)	n=6
Practice Factors	7.Secure e-Messaging Other Providers Requires Physicians to Control other's behaviors	"It's modifying peer behavior. We are expected presently to make 10% of our specialists and whatever referrals we make outside of the office to be transmitted via email. While personally, I applaud the superiority of email over fax or other methods, I cannot force other medical offices to embrace secure email, provide a secure email destination, and change the way they do business" P6 (Office Manager)	n=10

Table 3 (cont.)

Themes	Subthemes	Quotes	No. of Respondents Identifying Themes/Subthemes
Practice Factors (cont.)	Specialists often not participating in MU	"Last year with the Meaningful Use stage 2 part one we had to exempt ourselves from that particular criteria. We sent faxes to most of the offices in town and said that we are not able to send to you are you able to send to us? and pretty much everyone said, No." P7 (Physician) "It turned out that most of our specialist colleagues didn't have secure e-mailing. With stage two it really became an extra work fiasco." P5 (Physician)	
	8. Independent Small Primary Care Practice Burdensome		n=10
	Time	"They were time consuming because every time there was something new or an update to the program and then we also had to… If we had update server, then we had to get IT people involved, so it was time consuming, very much so." P3 (Office Manager)	
	Costs	"They require a significant capital outlay, I had to buy--upgrade to computers, I was already in an Apple environment but I had to buy upgraded computers and I probably spent up worth 30,000 on hardware and of course I had to purchase the software package and probably out 50-grand something like that before all was said and done to initiate Powermed." P11 (Physician)	

Table 3 (cont.)

Themes	Subthemes	Quotes	No. of Respondents Identifying Themes/Subthemes
Practice Factors (cont.)	Staff	"I think any small practices that don't have licensed professional support staff to assist the physicians have a challenge like we did, and we just dealt with it by trying to minimize the stuff that they absolutely have to do by regulations as a licensed professional. We tried to offload whatever we could to the administrative staff." P1 (Office Manager)	
	9.CQMs/Patient Outcomes Not an optimum measure of good patient care	"We really don't see the usefulness of the CQMs… It was so cumbersome and so silly because it was just sending in data reporting on like with diabetes it wasn't prompting the doctors to do anything to improve patient care. It was just filling in blanks" P1 (Office Manager)	n=9
Regulatory Programs	10.New Programs Reduce number of measures/data collected	"…twenty-three quality measures, that's kind of woo-ha, come on. That's just because you want to generate data. You want to publish. You have all kinds of ulterior motives that have nothing to do with the patient-physician relationship. Let's bring it back down to what does a doctor need, to what could the patient use and it's pretty straightforward." P11 (Physician)	n=6
	Need frontline provider input	"But this whole thing seems poorly thought out, it really does, and that maybe there weren't enough docs putting input into it for one reason or another and it could have been done much better I think." P8 (Physician)	

Table 3 (cont.)

Themes	Subthemes	Quotes	No. of Respondents Identifying Themes/Subthemes
Regulatory Programs (cont.)	11.Penalties Ineffective	**"**Right now, it seems to be a pass-fail arrangement where you have, pick a number, 15 objectives, and you either meet all 15 and pass, or you meet only 14 out of 15, and you fail. To me, there should be at least some kind of recognition for what is being accomplished. For example, if I'm in an area, and simply, my specialists just do not get on board and I do not have the realistic ability to get 10% or 20% or 50%, or whatever, the new threshold becomes via referrals done the way they expect, okay? So, am I just doomed to 100% of the penalty because of that?" P6 (Office Manager)	n=5
Health Information Exchange	12.Interoperability Premature Need Standardization	"When you are talking about computers and everybody sharing information, talking and all this other stuff, I think we are light years away from it, I mean we are just not there yet." P10 (Office Manager) "I think everybody has to be on the HL7 system, and this is the basic data that we all are going to have, and it's all going to be available, here's where it's going to be available, and we can all access it, we can all upload to, we can download from it." P5 (Physician)	n=10

Implementation Prior to Meaningful Use

Nine respondents described what they perceived as benefits to utilizing EHRs in their practice. All but one of these respondents had implemented EHRs in their practices prior to the Meaningful Use program. One respondent was a full-time physician and an EHR developer. He had bias toward his own EHR system. "We love it, it's the best EMR in the world, but I'm a little biased there. That's why we created it because most EMRs are really very difficult to work with." (P5) However, another physician coincidentally used this EHR system and also perceived the EHR positively. "It turns out that in 2009, Dr. [X] partnered with another physician who was actually one of the co-developers of the EMR that we're using, and we were actually the beta study for this new EHR in 2009. It's now in Meaningful Use stage II, certified and on the open market as [X] EMR, so we've been playing with EMRs early in the game. EMR is great, but Meaningful Use is not." (P6) Another physician had extensive IT knowledge and had implemented his first EMR in 2003.   A third physician had been in charge of implementing an EHR system while a resident and supported using EHRs in practice. These IT experienced physicians stated they saw benefits of implementing EHRs into physician practices and that was an impetus for doing so prior to any government incentive programs; notwithstanding, all four expressed frustrations with the Meaningful Use program. Many of the comments focused on the benefits of EHRs increasing efficiency through streamlining workflow as well as e-prescribing benefits. These comments were based on experiences before the Meaningful Use program began. A

respondent office manager stated, "We were committed to the EMR. Meaningful Use had nothing to do with our embracing an EMR." (P6)

A major benefit perceived by several respondents included access to patient records from their office when on call or at home. An office manager stated, "So now, having all the information at their fingertips was life changing as far as access to patient records when they were on call over the weekend or at night, they could have remote access so they always had access to patient information." (P1)

Implementation Post Meaningful Use

When asked about EHR experiences after the Meaningful Use program was implemented, one physician stated, "Taking care of patients even in a best situation is challenging. When you've got to stare at the computer screen and you've got multiple screens that you have to open, and then it slows down, and then it makes a mistake. Believe me, and I've worked on a different system before I used [EHR X], that's why we created [EHR X], and it was really hard. If you were not vigilant that the EMR in and of itself would hurt your patient." (P5) He continued, "It is scary. It's the type of thing, like I said, you would have to be vigilant to monitor that the system wasn't creating some type of error. Even more subtle or simpler things, it was so slow that you just had to cut some corner. You couldn't charge everything you wanted to, so the next time you saw the patient it wasn't clear what you did."

System updates required

Another burden on practices was that EHR systems had to be updated to be in compliance with Meaningful Use requirements and subsequent changes. One office manager respondent said, "They were time consuming because every time there was

something new or an update to the program and then we also had to… If we had update

server, then we had to get IT people involved, so it was time consuming, very much so,

yes." (P3)

Staff education

Staff education was also needed by practices to comply with Meaningful Use and

consumed time from routine practice tasks. When a respondent was asked about the

Meaningful Use program's impacts to practice resources, the individual (office manager)

responded, "Education. At first, it was understanding the requirement and then giving

everyone in the practice the information that they needed in order to facilitate and fulfill

the requirements. The doctor actually increased her staff over the last year and a half

probably to help her with some of… to pick up some of the slack, so we have four and a

half employees." (P3)

Redundant/irrelevant clinical data collected

All eleven practices commented that the Meaningful Use program did not fit their

clinical workflows. A recurring theme was that the data input that was requested did not

seem to parallel frontline primary practice care delivery. A respondent, who was the

practice office manager, stated, "It's hard to advance through the information here that

we put into the computer and then have it go out through these measures. I don't know if

that is actually representing the care that we are providing fully." (P3)   Respondents

stated that redundant or irrelevant data was requested. A physician said, "They also want

a lot of irrelevant data that you know is in here, questions like do you wear a seat-belt, are

you smoker." (P2)

Stage 2 complex

Several respondents expressed that the first stage of the Meaningful Use program was generally straightforward. One physician elaborated, "It started off fine and the money that they gave upfront helped offset a very tiny bit of outlay people had, it never came close to really paying folks for reimbursing for the amount of time and capital outlaid but at least it was a token, it brought an awful a lot of doctors on board - that was good thing - but then it sort of spun out of control and the other half of that is that the vendors saw a pot of gold here, their clinical product generally sucks, it's really crappy, you end up doing a lot of your own work and then the worst case is you create generic templates that don't fit the actual patient visit that document stuff that wasn't on it, that stuff that doesn't exist and that's really dangerous from a liability stand point but what they're really good at is the billing side." (P11)

Respondents found the changing requirements of Meaningful Use a challenge and several stated that the changes were not communicated effectively and did not allow enough time for the changes to be implemented. A physician respondent explained, "It was a constant nuisance, is what it was. I'd say the worst thing that kept happening was that they kept changing. Therefore, when anybody got comfortable with one focus of the program it would change. The way that the changes were announced is horrible, and who do you hear it from? I don't even know who you're supposed to hear it from. I just have a whole bunch of sources, and the information tends to show up at some point, but I've always questioned who is the focal point of the Meaningful Use program, how are we supposed to learn these things." (P5) Another physician respondent stated, "The

reporting process is a nightmare." (P6) He continued, "I feel like I need to be a Mensa member to navigate the process, all the time spent in this is time taken away from other tasks." (P6) The majority of respondents expressed that the time required to enter the data and attempt to comply with the program requirements took time away from patient care. Additionally, time was needed to educate and train the staff on stage one and changing requirements.

Cost burdens

Two practices stated that the financial incentives were not motivating factors in deciding to participate in Meaningful Use. Several other physicians expressed that the initial financial incentives covered much of costs but as the program continued, they incurred practice debt. An office manager said, "Well, in the beginning the incentives payments covered the cost. But this past year, we spent more than we were going to get." (P3)

Patient Care Related

Impact on patient care

Improvement

Only one respondent – who was an office manager – expressed that the Meaningful Use program positively impacted patient care: "I think it's improved it actually. It enables the patient to take something home that tells them about their appointment and reminds them of the changes that were made and… and go online look at the lab results. I think that it has actually helped the patient to be able to be more informed." (P3) When she was asked about how the practice would be impacted if Meaningful Use was discontinued or revised

she stated it would be a relief because physicians would no longer be "stressed" about possible financial penalties.

No improvement

Ten respondents stated that the program did not improve the patient care their office routinely delivered. Many expressed concerns regarding the amount of time the program took away from patient care. A practice office manager stated, "I would say that the whole Meaningful Use program has not helped patient care. The data they are collecting is not useful." (P1)

One physician felt patient care had been detrimentally impacted. "First of all, I believe what we're going to see is that Meaningful Use actually worsened care. If we can ever get at the data, and I doubt that we can, you will find that the distraction… That distraction created by all of this actually harmed patients, and it actually worsened the quality of care. That's my opinion and I think that you just gave people way too many things to do that have nothing to do with actually taking care of patients." (P5)

When another respondent was asked what type of impact Meaningful Use had on patient care, the practice office manager stated, "I would say no. I mean for us no. And it has not changed how we perform our care. For an average other doctor, maybe it brought to their forefront to ask and do. Like I said this is stuff we had done to start the practice back in 1990." (P10) Another physician respondent was concerned that the program reduced the number of patients he usually sees on a daily basis and stated, "For me, it hasn't helped give my patients better care and, if anything, it may have hurt my patients a little bit because there are times when I am so busy I can't see more people. So, I have to tell people, 'I can't see you.'" He continued, "I think in summary, EHR is not

going to make a good physician practice better but I think what it's going to do is make a poor physician practice to a minimum." (P7)

Several respondents explained that they were already providing good care for their patients and that Meaningful Use was just a way for CMS to collect more unnecessary data. A practice office manager said, "For us, it's just a matter of showing up and reporting and demonstrating that we're doing everything they wanted for years. It hasn't had any real impact in terms of… our patients haven't perceived any change in their quality of care because of this. We were doing it to start." (P6)

Most physicians were concerned about requirements that required that they attempt to control or change patient behavior. A physician respondent stated, "It's making me try to change the patient's mind of how they want the information and how they want to use a doctor and the patients aren't there yet." (P4)

Other respondents felt the EHR was an intrusion between the patient and physician and, due to the cumbersome nature of data entry in the multiple fields for Meaningful Use compliance, that there was a risk of entering information in error or relying on cut and paste information from other providers which is not useful and could be inaccurate.

There were several comments about the benefits of e-prescribing. A physician respondent stated, "The electronic prescribing has allowed physicians to catch either errors in prescribing, duplication of prescriptions, errors in dosing because they are rigged--major flags, so that's a good thing." (P11). Another physician said, "The EHR came along and asked me for medication the first time then it was basically click, click, click, click, done. So, I think that helped quite a bit in terms of saving time but some of

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the benefits the EHR touts as far as helping you manage populations and such, I did not

see that at all." (P7)

Patient Portal Requirement

All participants discussed the patient portal requirement. The Meaningful Use

requirements required that physicians utilize a patient portal and that a certain percentage

of patients utilize the portal.

Patients prefer to talk to physician/staff

The same office manager respondent that expressed that the program positively

impacted patients was asked about the impact of the patient portal requirement. She

replied, "We do have a patient portal and some of patients are using it, but we find that

probably the majority of our patients either don't have an e-mail or don't want to go with

that… Patients do prefer the people. There are a few people that like the technology but

most of them prefer talking to us." (P6) This theme continued among all respondents. A

physician respondent said, "People still want to pick up the phone and talk to you." (P11)

Communication with patients was a key factor in providing good care for the

respondents. A physician respondent explained, "It's completely arbitrary and stupid to

say that we need to communicate with our patients in a particular way. I come from a

practice where we are extraordinarily good at communicating with our patients over the

phone, and we follow up a great deal, and we tend to have a lot of elderly patients who do

not have e-mail, but to enforce how we communicate. And then to add the added burden

of recording what we communicated. Not only do I record my communication, but then I

have to record that I've recorded it in order to get the data point. That's a really stupid

way to do things, and while I understand fully - I electronically communicate all the time

- to pick how I communicate with my patients was completely artificial, and then to say that I had to do a certain percentage of the time, that's insanity because that meant we were actually – we had to actually bother people to e-mail us to satisfy that requirement, and that's beyond idiotic." (P5) He continued, "it is important to communicate with your patients, but to put a percentage on something like that – it may not be reality - and why would you, that's just a dumb way to do things and it's artificial, and it just creates extra work, and its work way beyond anything that we do in the clinical realm. It's to create a form of communication, and then record that we created such. It was poorly planned from the beginning, and it just created a lot of administrative hassles." (P5)

Requires physician to control patient behavior

Another issue associated with the portal requirement that was a recurrent issue of frustration was that it requires physicians to attempt to control patient behavior. A practice office manager stated, "Well, to me the two most unreasonable and most difficult things for us to deal with are (1) the expectation that our geriatric panelist patients who, largely, do not have internet or a computer, are supposed to be using a portal… That just isn't achievable with the demographic that we have in this area [rural]… I just don't understand how they can hold the primary care doctor accountable for modifying the behavior and lifestyle of their patients on using the internet… We have a hard enough time just getting their lab work done and getting them to show up at their appointments, and we have a hard enough time managing them medically…" (P6)

One physician said she was able to get patient compliance with the portal by telling her patients they could only make appointments through the portal and that they

could not be a patient unless they used it. "And so, the only way you can be a patient with me is if you get a portal code." (P4)

Patient/Physician Eye Contact

Can inhibit patient/provider interaction

Six physicians stated that the EHR had the potential to impede the interaction between the physician and patient. One stated, "It's not exactly my own word but I heard it called 'third person in the room' and its really kind of distraction." (P9) Another physician said, "Another thing it does is put a barrier between you and the patient. We're very personal practice, we've very close relationship with our patients, lot of eye contact." (P2)

Work arounds

EHR usability

However, two of those physicians stated that they overcame this problem. One clinician did so through utilizing an EHR that had been appropriately designed to decrease this issue by minimizing the number of clicks required to advance through the software program when interacting with the client. "[EHR X] is set up specifically to encourage better communication. We made it so simple to use that – and I was extraordinarily careful about making sure that I sit in a way that I can make eye contact with my patients." (P5)

Positioning

The other physician used a hospital bed table and set up his laptop so there was limited eye contact interference. "What I did is I bought over bed tables…so I stand there with my laptop here where I can have eye contact, you know, and try to avoid some of

that anyway with patients but still it's very distracting, don't you think?" (P8)   Two other

physicians who were concerned about this issue made efforts to look at the patient to

minimize the lack of eye contact.   One stated, "So I have my patient's position to the

side of a desk, so they've never seen the back of my head with the bald spot. At worse,

seeing me in profile and I could easily--and I'm surely quick with the computer so I can

easily do something that--then I turn and look them in the eye because we're on eye level,

face to face. And so, I'm particularly careful that we're looking at each other." (P11)

Another physician said, "Our tables and such are arranged that I sit diagonally from the

patient so my back isn't turned to them I am looking at them, I am engaging with them, I

am making eye contact with them constantly and when something important comes

along, when I am talking with them about an anti-depressant, then they say, 'Well, I just

got separated' Then I stop typing and look at them and I give them my full attention. I am

putting the data in as I am going, then I examine them and it if there's a key pertinent fact,

the lung sounds were in the left base, I say, 'Give me a second, I just want to write this

because once you leave I will forget whether it was right or left.' And they understand

that." (P7)

Practice Factors

The respondents stated that complying with the requirements of Meaningful Use

were time consuming, often required hiring additional staff and were costly both in outlay

for hardware and software improvements and in staff resources.

Secure Direct e-Messaging Requirement

Meaningful Use required that physicians meet a certain percentage of communication with other providers through secure direct electronic messaging. Ten respondents found this to be a challenge.

Requires Physicians to control other's behaviors

Several respondents also reiterated the difficulty in complying with requirements that involved attempting to manage the behaviors of others (similar to the patient portal requirement). One physician stated, "We would just speak to the other doctor's offices and first of all they try to give us their regular e-mails, but then technically for them to have a secure e-mail and us to have a secure e-mail – it just took so much more work than you thought it should. We were fairly certain for quite some time that we were not going to find anyone that we could actually e-mail to." (P5) Another practice office manager stated that they had to continue faxing other providers because specialists decided the costs of Meaningful Use outweighed the benefits or the IT systems were incompatible. "[W]e are pretty much forced to do that only because those specialists refuse to accept anything but the fax." (P6) He continued by describing the difficulty of complying with the requirements that make the physician responsible for modifying other's behaviors ("Number 1" being the patient portal requirement quoted above), "Number 2 is actually somewhat parallel. It's not modifying patient behavior, it's modifying peer behavior. Peer behavior refers to specialists and where we are expected presently to make 10% of our specialists and peers and whatever referrals we make outside of the office to be transmitted via email. While personally, I applaud the superiority of email over fax or

other methods, I cannot force other medical offices to embrace secure email, provide a secure email destination, and change the way they do business. I can't do that." (P6)

Specialists often not participating in meaningful use

Another practice office manager stated, "Also with stage two, we found it difficult to meet all of the requirements because other offices weren't up to those requirements...mostly the direct messaging… Secure Direct Messaging gave us a fit… We had some offices that stopped doing it and they were going to take the penalty for stopping." (P3) Another physician said, "Last year with the Meaningful Use stage two, part one we had to exempt ourselves from that particular criteria. We sent faxes to most of the offices in town and said that we are not able to send to you are you able to send to us? And pretty much everyone said, No." (P7)

Independent Small Primary Care Practice

Other issues that were recurrent concerned the ability of independent small primary care practices to continue operating. Several respondents expressed frustration with the number of government programs they had to comply with: One physician explained, "Here they are just hanging on for dear life just to practice. We've introduced EMRs many of which are very difficult to use, they are extraordinary expensive. They are trying to keep up with PQRS, PTMD, Meaningful Use, some of them have to join ACOs. There's cowardess coming from every direction, and both from a cost perspective, and a time perspective, and information perspective, and implementation perspective. It's killing them, it's just killing them. They're piling on these objectives, and none of these programs, not one, has in anyway has actually improved care or helped physicians deliver better care. It's all a bunch of crap. I'm a big fan of quality improvement, and I do it quite

a bit. I've done it my entire career, I've done it quite successfully, and it can be done, and it can be done even on computers, but they haven't, they haven't done it at all." (P5) Other respondents stated that when an office gets use to dealing with one program, it changes or is eliminated.

Burdensome

Respondents expressed the burdens involved in complying with the incentive program for the small independent primary care practice with limited resources related to time, costs and staff.

Time

In regard to the requirements of the incentive program, one physician respondent stated, "Obviously, we get medical records from the numerous specialists all the time and an ankle sprain where you know all the guy does is look at the ankle and says you are doing well, I will see you back in four weeks, probably a two-minute visit; we get three pages of notes where there is a social history, family history, list of medications and reams of irrelevant data. Sometimes, it's very hard just to find the relevant data." (P2) He continued, "Now, they repeat the same thing visit after visit after visit; data that's totally irrelevant at the present moment in time and you get reader fatigue and you don't even bother to look anymore." Another physician stated, "The other, you know, thing that's kind of out of my control is I can dive in there, I can do a little bit, but if I have to ask for something five times, I won't have time to do that, you know." (P4) Another physician described the time-consuming nature of the design of the EHR software, "And like the prescription button, it'll say in the instructions, one tablet every six hours and then it'll say 30 and then next would be tablet or capsule. Well, it should know since you

already put tablet up there it is--but you got to, and if you don't forget to do that then you click send it takes you back up and you have--that means it just takes time." (P8)

Costs

Ten practices noted that the costs of Meaningful Use compliance were burdensome to their practice, even with the program financial incentives. One physician, who had extensive IT knowledge and had been using an EHR since 2003 which he had improved throughout the years to be customized to his practice, stated that complying with Meaningful Use was costly. He stated, "They require a significant capital outlay, I had to buy--upgrade the computers, I was already in an Apple environment, but I had to buy upgraded computers and I probably spent upwards of 30,000 on hardware and of course I had to purchase the software package and probably out 50-grand something like that before all was said and done to initiate Powermed." (P11)

Staff

Another burden to the small practice was that the requirements of the incentive program added demands to their staff. A practice office manager said, "I think any small practices that don't have licensed professional support staff to assist the physicians have a challenge like we did, and we just dealt with it by trying to minimize the stuff that they absolutely have to do by regulations as a licensed professional. We tried to offload whatever we could to the administrative staff." (P1)

Clinical Quality Measures and Patient Outcomes

Not an optimum measure of good patient care

Respondents expressed concern with the number of clinical quality measures that were required and how physicians were assessed on patient outcomes. Again, they

expressed dissatisfaction with using patient outcomes as a determinant of good patient care. They stated that they should be assessed on what is done in the office as they cannot control all patient behavior, such as whether the patient takes their medication, comes back for their follow-up visit or moves. Additionally, practices treating large Medicare populations stated that their patients are dealing with a patient population of sicker patients on multiple medications. One office manager respondent said, "The real bottom line here is, without patient outcome things, if we can demonstrate that we are creating the personal care plan, making recommendations for the diabetics to improve their outcomes, making the recommendations for the hypertension to come down, and all that stuff, we have done our job, and we should get flying colors. I can tell you with complete confidence, there isn't a patient who walks in this building that doesn't get all of the counseling, the educational information, and the care plan that they need to achieve better results" (P6).

Regulatory Programs

New programs

Reduce number of measures/data collected

Respondents were asked about their ideas on new government programs that might be more or less burdensome.   A physician respondent said, "Don't do anything like what they did with Meaningful Use. The reason is that in the way they did it previously they, like, they just piled a whole bunch of responsibilities on to physicians' offices, and that you are responsible for all health maintenance, you're responsible for every aspect of quality of care. What we could do if we had true interoperability is say 'Hey, health maintenance, why don't we approach that from a public health perspective.' We've got

data for every patient and let's figure out how to get mammograms on everybody… If you said, 'Look, this year, as a nation, we're going to focus on two things, we're going to focus on simple stuff too, we're going to focus on getting mammograms, and 80% recommended of women and colonoscopy, 80% of recommended people and that's all we're going to do as a nation, that's it. And then we would do it. The next year you're going to have two more. In 10 years, if you did two a year you'd have 20 quality measures that you're focused on every year, and you build up slowly." (P5)

Need frontline provider input

Six practices expressed the need for input from physicians in government programs that have a goal of improving patient care, particularly feedback from the small practice primary care physician, so that it is designed to fit clinical workflow. One physician stated, "But this whole thing seems poorly thought out, it really does, and that maybe there weren't enough docs putting input into it for one reason or another and it could have been done much better I think." (P8)

Another respondent, who was the office manager and husband of the physician, explained that more physicians should adopt the Ideal Practice Model and described the model. "We have two providers, and every patient encounter is a minimum of 30 minutes. We only see 15 patients maximum per provider per day. Back in 2009, when my wife began a private medical practice as opposed to working for a hospital or other corporation, embracing the Ideal Medical Practice model was the whole motivation for getting away and going into business for herself… The whole Ideal Medical Practice model is based on all of the issues that Meaningful Use, patient-centered medical, the PCMH and all this other stuff that came out eventually." (P6)

Penalties

Ineffective

Another concern expressed by several respondents was that penalties were imposed on an all or nothing basis. A practice manager respondent stated, "The other thing that I would suggest, at the very least, okay? Right now, it seems to be a pass-fail arrangement where you have, pick a number, 15 objectives, and you either meet all 15 and pass, or you meet only 14 out of 15, and you fail. To me, there should be at least some kind of recognition for what is being accomplished. For example, if I'm in an area, and simply, my specialists just do not get on board and I do not have the realistic ability to get 10% or 20% or 50%, or whatever, the new threshold becomes via referrals done the way they expect, okay? So, am I just doomed to 100% of the penalty because of that?" (P6)

Health information exchange

Interoperability

Respondents also stated that, although interoperability was a goal of Meaningful Use, that the program requirements encouraging it were not realistic.

Premature

The physician that has IT experience and adopted an EHR in 2003 said, "When you are talking about computers and everybody sharing information, talking and all this other stuff, I think we are light years away from it, I mean we are just not there yet." (P10)

Standardization

Additionally, several respondents expressed the need for standardization as necessary for interoperability to effectively work. A physician who helped design an EHR system said, "I think everybody has to be on the HL7 system, and this is the basic data that we all are going to have, and it's all going to be available, here's where it's going to be available, and we can all access it, we can all upload to, we can download from it." (P5) Another physician, with an IT background, stated that interoperability would only occur if the government created the infrastructure, similar to other countries, like Denmark. "It's a huge, huge infrastructure lift. It would have to be done by very large corporations or the federal government. It's not something that individual practices or docs, even state medical societies can do very easily." (P9)

Chapter 6: Discussion

Qualitative methods are used in research in order to understand complex social processes and to garner understanding from the study participants' perspectives (Malterud, 2001).   They are also used to uncover beliefs, values, and motivations for individual health behaviors (Berkwitz, 1998).   A qualitative study can be exploratory and is used to generate unique insights (Crabtree & Miller, 1999; Pope & Mays, 1995).   The present study revealed areas for further research, including identifying the unique needs of the small practice primary care physician, designing EHR technologies and software that coincide with their clinical workflow, and minimizing interruptions in the delivery of care and patient/physician interaction.

Summary of Findings

Study participants expressed benefits of utilizing EHRs in their practice but put emphasis on the benefits they experienced prior to the implementation of the Meaningful Use incentive program. Nine practices expressed concerns that Meaningful Use requirements did not parallel their clinical workflows. Other concerns were interruptions to their practices imposed by the changing requirements of Meaningful Use that required system updates by EHR vendors, staff training and additional costs. They cited issues with redundant data entry requirements, too much and irrelevant data entry, the risk of data entry error and the time-consuming nature of complying with the requirements. Two respondents stated that they routinely stayed late at the office to fulfill the requirements for Meaningful Use and other regulatory programs. They did express positive feedback regarding the ability to do work remotely and having access to patient records as needed

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or when on call as a result of EHR implementation (which they experienced prior to the Meaningful Use program).

All respondents, except one, stated that the Meaningful Use program had not improved patient care. Two physicians stated that they felt the program had worsened care. Another stated that there were EHR risks inherent with software or with inaccurate data entry that could harm the patient. Every respondent stated that program objectives that required the physician to change the behavior of others were not appropriate; they specifically referred to both the objective requiring a certain percentage of patients to use the patient portal and the objective requiring secure, direct messaging with other providers. They voiced concerns that they should not be measured on behaviors beyond their control and that attempting to influence behaviors took even more time away from their practice responsibilities, specifically caring for the patient.   Participants also questioned the benefit to the patient of having access to a portal when patients preferred to talk to a staff member or physician. These practices had Medicare and Medicaid patients and also expressed that those patients may not have access to or do not want to communicate online. Six participants were aware that EHRs could reduce eye contact and patient interaction but four took specific measures to reduce those impacts. Another mentioned that using a scribe so that the physician could focus on the patient was too cost prohibitive for a small practice.

Additionally, the secure direct e-messaging with other providers requirement was difficult to meet and negatively impacted their practice. Ten practices cited this requirement as taking time away from their practices due to the difficulty in finding other specialist providers who had the secure EHR functionality to participate. They did not

believe a measurement should be one in which success is determined by the behavior of other individuals.

Other recurrent practice issues with this program were the cost, time and staff burdens to independent small practices that were incurred because their resources are limited (ten practices were independently owned). Respondents were also concerned that the requirements of multiple regulatory programs were confusing and time consuming. The changing requirements of Meaningful Use resulted in increased costs to the practice as some had to hire additional staff, others had to decrease daily patient volume so that the EHR vendor could upgrade the system to comply with the new stage requirements, and others had to outlay additional money for the upgrades. Additionally, they voiced concerns that multiple, complex regulatory requirements, in addition to other day-to-day practice responsibilities, could ultimately lead to the independent small practice disappearing.

Another recurring issue was clinical quality measures and patient outcome measures. Respondents stated that the CQMs did not match their primary care practice. Physicians also stated that they should be assessed by what they do while the patient is in the office and how they follow-up, not on patient outcomes due to factors beyond their control (e.g., not returning to the practice, moving, going to the hospital instead of the practice).

Physicians also felt that policy makers did not obtain enough input from frontline primary care clinicians and, instead, relied on physicians who were academicians or had not practiced and were unfamiliar with the realities of a real world primary care practice.

The absence of this frontline input resulted in government programs and EHR system designs that did not match clinical workflows.

No participants believed that the imposition of financial penalties was a good motivator to improve care. One physician commented that penalties may influence those physicians who are sub-par but are inappropriate for good physicians.

All respondents commented that interoperability was premature due to the vast number of EHR choices and lack of standardization.   Unless a practice was a part of a hospital system, such as an Accountable Care Organization (ACO) - one physician interviewed was - then health information exchange was difficult due to system disparities. Even the physician that was part of an ACO said the EHR system they used experienced information exchange issues and was sometimes so slow that work flow was significantly impeded across the network.

The findings suggest that the benefits (monetary incentives) of the Meaningful Use regulatory program do not outweigh the burdens imposed on physician practices (time, cost, resources) and negatively impact patient care. Scant evidence was discovered of any direct benefits to patients as time and interaction with their clinicians is reduced. All of these findings are areas for additional research to assist policy makers in developing effective patient care improvement programs that minimize detrimental impacts to physician practices.

Findings as they relate to conceptual framework

The research findings relate to the disruption in technology theory and can provide further guidance in policy development. DIT is not a methodology but was used for assistance in adding additional depth to interpreting the data. "The intentional

introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, the organization or the wider society" is a definition of innovation put forth in The Social Psychology of Innovation in Groups: In Innovation and Creativity at Work: Psychological and Organizational Strategies (West, 1990). Innovations in health care are usually comprised of "new services, new ways of working and/or new technologies" (Länsisalmi et al., 2006). These new technologies are intended to improve such things as health care delivery and patient outcomes. Meaningful Use was a new regulatory program intended to promote the implementation and use of EHRs to improve care and spur interoperability.

One theory used in qualitative health care research involves the concept of disruption in innovation, (Christensen, 1997) known now more commonly as disruption in technology (DIT) (Christensen, 1997 and 2003). Disruptive innovations occur infrequently, they are typically less expensive, simpler and more convenient than prior technologies but, initially, usually have performance issues (Christensen 1997; Christensen and Raynor 2003; Christensen, Anthony, and Roth 2004). DIT is utilized to explain advances in technology that improve a service, process or product in a way not anticipated by the market (Sultan & Van de Bunt-Kokhuis, 2012). (An example is the emergence PC computers a few years after the first Apple computer). PCs were less expensive but experienced operations glitches. EHRs are also examples of health care innovations that, initially, were expensive and limited to a few vendors. As more EHR systems were developed, they became less costly, but were still significant investments. EHR systems require training of staff and involve interruptions in business practices

(e.g., installation, conversion from paper charting to electronic patient records).

Participant comments support the theory that the EHR has the capability of improving

some aspects of physician business practices if the EHR is designed to parallel physician

workflows. Physicians responded that the transfer from paper records to electronic

records optimized office space and the ability to access patient records when on call or at

home was an unanticipated benefit. However, in this study, the poorly designed

Meaningful Use program was added to an EHR, which physicians express has impeded

the process of care delivery. The functionality of the EHR has not been improved by the

incentive program's design and, instead, has resulted in resource infringement in terms of

the physician's time and capital outlay. Respondent's feedback in this study indicate that

policy maker's perceptions of a program design to improve care is substantially divergent

from frontline caregiver reality. DIT could provide insight to policymakers in designing

a program that more closely matches a clinician's workflow and making office practices

more efficient as opposed to less so.

How Findings Extend Prior Research

The research indicates that office-based physician EHR use has increased

following the Meaningful Use program, however, research on the impacts of the

Meaningful Use program on the small primary care physician practice is still limited

(Jamoom, 2015). The findings of this study parallel some of the previous research.

Sines and colleagues, who looked at small multi-specialty practices, found similar themes

such as concerns regarding reduced face-to-face patient time, decreased patient volume

due to EHR utilization issues and requirements, and forcing small practices out of

business (Sines, et al., 2017). Similarly, the Meigs et al. study conducted in Texas, found

that small practice primary care physicians expressed frustrations with the lack of EHR interoperability, that using an EHR increases a physician's workload, and that physicians do not believe EHR use improves quality of care and may negatively impact patient care (Meigs, et al., 2016).

The study results also coincide with the work of Howard and colleagues who assessed the impact of EHRs on work burdens (but not in the context of Meaningful Use). They found that EHR use reduced work burdens with some functions such as prescribing, but increased work in other areas such as charting and chronic disease management (Howard, et al., 2013). Respondents in the present study mentioned benefits of e-prescribing prior to the advent of the Meaningful Use program. Other respondents expressed frustration with e-prescribing functionality in terms of interfacing with Allscripts or inefficiencies in the software program design which required multiple entries, thereby increasing the likelihood of data entry errors. Another respondent pointed out a dosage error in the software that could have had adverse impacts on the patient.

Physicians did express that the financial incentives in stage one of Meaningful Use were motivators for participation (even though they also knew that participation was mandatory or they would be financially penalized). This parallels the findings of the Ross et al. study in which respondents stated they would value financial incentives to implement an EHR system (Ross, et al., 2010). However, the respondents stated that the practice costs of reduced incentives and increased demands in stage two of Meaningful Use significantly outweighed the monetary benefits. Only one physician in this study stated they accessed a regional extension center for assistance and that experience was

not helpful. This is contrary to the Ross et al. findings that suggested that support from technical assistance centers would be facilitators to EHR adoption. Physicians in this study expressed that their EHR vendors provided technical support but that HIE was not occurring due to disparities among systems, lack of other provider participation in Meaningful Use, and the lack of secure direct e-communication functionality.

Although not specifically researching the small practice physician, several studies had similar findings regarding time burdens and dissatisfaction with EHR usability with Meaningful Use. Robertson and colleagues found that after hours EHR tasks resulted in professional burnout and reduced work-life satisfaction (Robertson, et al., 2017), and Sinsky and colleagues found that clinicians spend one to two hours of personal time each night doing additional computer and clerical work (Sinsky, et al., 2016). Shanafelt, et al. found reduced physician job satisfaction and increased risk of professional burnout as a result of additional work hours imposed with EHRs (Shanafelt, et al., 2016). Similarly, respondents in this study also expressed frustrations with EHR data entry, but in the context of Meaningful Use requirements, which added to their work hours with data entry often done after clinical hours. Arndt and fellow researchers found, by analyzing EHR event log measurements, that physician's data entry on EHRs encompassed almost six hours of each day both during and after clinical work hours (Arndt, et al., 2017). The time burdens associated with patient portals and the frustrations with poor EHR usability found by Colligan, et al., coincides with the increased time required by the respondents in this study as a result of burdensome EHR systems and software that do not match clinical workflows and Meaningful Use requiring redundant data entry or other time-consuming data entry issues (Colligan, et al., 2016).

Finally, Friedberg et al. had similar findings to this study (Friedberg, et al. 2013). Although both a quantitative and qualitative study and not specifically researching the small primary care practice, they also found physician frustrations with clinical workflows that were mismatched with the EHR software, interference with face-to-face patient care, barriers to health information exchange, and impacts to practice revenues.

Policy Implications

The public policy goal of the HITECH Act is "to promote the adoption and meaningful use of interoperable health information technology (HIT) and qualified electronic health records (EHRs)" (HITECH Act, 2009). The goals of the HITECH Act for providers who become meaningful users of certified technology are: improve health care quality, safety and efficiency and reduce health disparities; engage patients and their families in health care; improve coordination of care; improve public and population health; and maintain privacy and security of health and personal information in the process (HFMA, 2011). HHS has developed several programs with goals of containing costs and improving patient care. An aim of the Meaningful Use program was to spur interoperability among providers through encouraging the purchase and utilization of EHRs.

Prior research has not extensively explored the challenges small physician practices face in utilizing EHRs and complying with programs, like Meaningful Use, in care delivery. The findings complement other research and add further to the understanding of the perspectives of practicing primary care physicians regarding incorporating data collection programs into their practice. Policy makers have heard from health care providers voicing their dissatisfaction with the regulatory programs,

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including the patient engagement requirements and the "elusiveness" of interoperability (National Health Policy Forum, 2015). New physician payment mechanisms created in the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) complicate policy issues. Under MACRA, physicians may choose to participate in alternative payment models (APMs), such as accountable care organizations or patient-centered medical homes, or in a merit-based incentive payment system (MIPS). Meaningful Use requirements will be folded into MIPS. However, MACRA may further accelerate the trend of physicians leaving independent practices to become hospital employed (Squires & Blumenthal, 2016). The 2016 CMS final rule, Medicare Program; Merit-Based Incentive Payment System (MIPS) and Alternative Payment Model (APM) Incentive Under the Physician Fee Schedule, and Criteria for Physician Focused Payment Models, appears to recognize the challenges for the small, independent physician practice by specifically noting the need to protect small, independent practices in the regulations by forming a Physician-Focused Payment Model Technical Advisory Committee (PTAC) to review and evaluate stakeholder submitted physician focused payment models (PFPMs) and by excluding certain low volume practices from the new requirements in 2017. PFPMs are an opportunity for stakeholders to submit alternative payment models (APMs), in addition to the APMs that already exist, that provide more flexibility and incentivize clinicians that demonstrate the delivery of high quality patient care (Medicare Program; Merit-Based Incentive Payment System and Alternative Payment Model, 2016). Additionally, the CMS final rule on Medicare Programs: Revisions to Payment Policies under the Physician Fee Schedule and Other Revisions to Part B for CY 2018; Medicare Shared Savings Program Requirements; and Medicare Diabetes Prevention

Program published November 15, 2017, addresses some concerns from the literature such as hardship exemptions for small entities (Medicare Programs: Revisions to Payment Policies under the Physician Fee Schedule, 2017). Based on the small, independent primary care practice physicians' thoughts in this study about the existing quality measures in the Meaningful Use and other programs and the inapplicability of those measures to their practices, measuring quality remains a key issue for them. It is important that their unique feedback continues to be considered in the development of future payment policy, including quality measures, telehealth and alternative payment models.

A concern expressed by several physicians was that independent advisory groups are often comprised of experts and very few have members that are frontline physicians, specifically physicians from small, independent practices. The PTAC as it currently exists – although a possible step in the right direction if they consider frontline physician feedback routinely – has no physician representatives from small practices. Failing to understand the small practice physician perspective could result in a continued and costly trial and error regulatory process in which these physicians strive to comply with complex regulations - amidst decreased payment, time, and capital - only to encounter yet another new regulatory program because the previous one was ineffective. Instead of programs that continue to decrease physician payment, more efficient modes of care delivery should be expanded, such as telehealth. For example, all the practices in this study stated that the patient portal requirement was a failure due to their inability to control patient behavior beyond the office setting and because their patients prefer to communicate by phone or in the physician's office. Telehealth is a possible alternative

that would incorporate the objective of the patient portal into a platform in which the patient experienced both data access and direct verbal communication with the provider at reduced costs for both patient and physician.

As previously discussed, health care reform appears to be resulting in increased solo and small practice consolidation into larger practices or physicians seeking hospital employment (Squires & Blumenthal, 2016). Whether this is positive or negative for patient care delivery remains to be determined. However, policies to help small primary care physician practices advance should continue as research suggests their patients are less likely to visit the emergency department and that total spending per patient is lower than hospital-owned practices (Pesko, et al., 2017). What is not clear is whether hospital-owned and larger practices provide better care, or will provide better care under new alternative payment models, than small practices and more research is needed. At a minimum, policies should be inclusive of all practice types and attempt to determine and incorporate the advantages one type may have over the other into policy.

Further research is needed as MACRA requirements proceed in order to to make those assessments. In the meantime, regulations that put the small practice at a disadvantage or impose complex regulatory burdens should be revised. The physicians in this study expressed an interest in providing input into new program designs but time is a high value commodity and their first priority is caring for the patient. Submitting comments to proposed rules have limited influence on final regulations and are not the optimum method for feedback assessment. Physicians expressed the desire for a mechanism for input at the inception of new program design consideration. The value of the small physician-owned practice should be recognized in developing policies to

contain cost and increase quality of care as evidence indicates these practices have lower patient readmission rates, lower average cost per patient and fewer preventable hospital readmissions than large and hospital-owned practices (McWilliams, et al., 2013; Casalino, et al., 2014; Robinson & Miller, 2014).

Therefore, preservation of the independent small practice could be an important facet in cost containment for policy makers to consider rather than health reform policies that accelerate abandonment of this organizational structure. Pesko, et al., emphasize that research suggests that physician-owned and smaller practices perform better than hospital-owned and larger practices; the trust and knowledge that develops between the small practice physician, staff and patients is a potential advantage that may outweigh resource advantages that hospital-owned and larger practices have (citing Landon, et al., 2008; Weeks, et al., 2010; McWilliams, et al.; Carlin, et al., 2014; Krawelski, et al, 2015). The policy issues are complex and additional research is warranted to understand the important and effective delivery of care methods and patient relationships that are developed between small primary care practice physicians and their patients. This qualitative study is important as it provides additional insight into the small primary care physicians' experiences with a government quality incentive program that they struggled to comply with and suggests that the program adversely impacted their practice resources and, most importantly, the care of their patients.

Physicians are looking for EHR systems and software that minimize workflow interruption, create practice efficiencies and positively impact patient care. This study uncovers some of the motivations of the small practice primary care physician in their attempts to implement EHRs in their practice and then revise their systems to be

compatible with Meaningful Use requirements throughout the various stages. Their experiences with health IT were explored and their values and beliefs about patient care were expressed, which could contribute to understanding the barriers they face. Physicians uniformly expressed that the benefits of the initial EHR investment prior to the Meaningful Use program outweighed the costs, however, the investment to comply with the requirements of Meaningful Use was cost prohibitive in terms of money, time and/or available resources for the small primary care practice, at least from their perspective.

Although qualitative research is not generalizable, the information garnered could assist policymakers in developing more effective programs, tools and incentives to assist them in utilizing EHR technologies with government programs. The important insights regarding motivations, behaviors and barriers expressed by the participants are potential subjects for exploration in future research to gain a better understanding of government programs that more closely align with the realities of frontline primary care practices.

The main concerns expressed in the study involved the government program's adverse impacts on time and limiting practice resources. The amount of information requested not only under Meaningful Use, but in tandem with other programs such as PQRS, was overwhelming to providers. Complying with the requirements took time away from providing care for their patients. Overall, the respondents saw value in utilizing EHRs and experienced more efficient workflows, until they became participants in the Meaningful Use program. They asked for program requirement simplification and reduced data collection as much of the requested data collection was redundant or unnecessary. Policymakers should consider programs and measures to ensure

simplification of programs, and requirements and assessments that are within the physician's control. Specific provider suggestions on data that should and should not be collected should also be considered to reduce redundancy and increase workflow and efficiency so that time allocated for patients is not impeded.

Study Limitations

This study was small and geographically limited. However, in an attempt to ensure a wide range of perspectives, a diverse demographic sample was obtained, and continued to be sought, until thematic saturation was met. These techniques are common to qualitative research to minimize concerns about generalizability; however, broad generalizability was not the purpose of this study. The study was carefully designed to meet criteria so that the qualitative research is methodologically sound (Giacomini, 2000). Additionally, a sample of this size is common for a study with this design (Yamazaki, 2009). Other limitations include concerns about the sample selection and bias. Perhaps respondents who were frustrated with the Meaningful Use program were more likely to want to be interviewed to voice their concerns. However, recruitment was based on whether an EHR was utilized in their practice, not whether they were satisfied or dissatisfied with it. Since Maryland was the geographic sample area, the findings maybe not be transferable to other states. Additionally, since small physician practices have different cost and organizational structures than larger practices, the findings may not be transferable to large practices. The study also focused on primary care practices which may also limit the transferability of findings to specialist settings. Another limitation is that only one individual from each practice was interviewed and additional insight could have been gained by interviewing every staff member that utilized the EHR

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or was indirectly impacted as a result of its use. However, the researcher did probe to select and interview the employee that was primarily responsible for EHR utilization in the practice. Data collected in this study was also self-reported by the respondent which could result in biases due to beliefs and recall. Unlike a survey, however, the researcher was able to probe for clarification and expansion of statements but this remains a limitation.

Another limitation of the study is that inter-rater reliability with multiple readers was not used in which additional insights and interpretations in coding could have resulted. However, a transparent and systematic process of intra-rater reliability was utilized in which each transcript received multiple coding and reviews by the researcher with two-month intervals in between reviews. The coding was then compared through standard reliability check procedures. Finally, findings could have been strengthened for internal validity through respondent review and comment on the findings, however, this was considered by the researcher and posed to some physician respondents but they stated they were too busy to participate beyond the interview and brief follow-up.

Conclusion

This study suggests that small practice primary care physicians have enthusiasm with EHR technology being utilized in their practice but also illustrates their dissatisfaction with the Meaningful Use program and its imposition on their practices. Future research is necessary to build on the findings and develop programs that have the flexibility to be customized to the physician's practice and patient population and to determine what practices may need additional outreach and support.

Physicians' positive experiences with EHRs prior to Meaningful Use and their attempt to participate in the program indicates that physicians are willing to implement new procedures, however, more input is needed from them in program design. As policy makers revise or develop new programs they should be cognizant of the concerns expressed in this study in order to minimize burdens to physician practices and adverse impacts to patient care.

Appendix I

Interview Guide

1) Introductory Question: How do you feel EHRs have impacted patient care?

2) Follow-up questions/probes will be developed relating to:

   i)   improvements in care

   ii)   time spent with patient

   iii)   outcomes – outcome of care improved

   iv)   increased compliance by patient in care

           directives

   v)   patient feedback (via the physician/staff)

   vi)   increase in number of patients seen

   vii)   percentage of patients in practice with chronic/serious

           conditions

   viii)   How have those patients been impacted?

   ix)   How has treatment of those patients been impacted?

   x) Other efficiencies? Inefficiencies?

   xi) Number of patients seen per day: increase or decrease?

   xii)   More time on care versus documenting the record?

   xiii)   Home earlier because work finished earlier (i.e.,

   impact on quality of life)

   xiv)   Do patients seem more satisfied since EHR system implementation?

xv)   What have discussions with other physicians relating to EHR systems

        been about?

xvi)   Investment amount? Future investment anticipated?

xvii)   Incremental improvements? What are they?

xviii)   Staff adoption/acceptance/training: time and expense related to

        adoption; other obstacles to adoption?

xix)   Has patient population increased?

xx)   Is secure access available when away from the office?

xxi)   Are patient records transmitted easily? Free from glitches? Safely

        and securely?

xxii)   Have paper copies been reduced or eliminated? Physical storage

        reduced?

Appendix II
Level II Codes

Before MU	IT person
Benefits	Measure
Big Practice versus Small	Money
Burdensome	MU
Challenges	MU Purpose
Changing Behavior	MU Stages
Clinical Decision Making	New Program Design
CMS	Patient Behavior
Communication with CMS	Patient Care
Communication with Other Providers	Patient Communication
Complex	Patient Outcomes
Compliance	Patient Portal
Complicated	Patient Characteristics
Control	Patient Type
Conversion Paper to edoc	Penalties
Conversion Time	Physician Impact
Cost	Physician Input
CPOE	Physicians Dropping Medicare/Medicaid Patients
CQMs	
Cut and Paste	Physicians Not Participating Taking Penalties
Data entry	Post MU
Decision to Convert	Practice Characteristics
Desire to remain independent	Practice impact
Detrimental Impacts	Program Design
Distraction/Nuisance	

Distrust	Privacy
Education	Purchase Research Timeline
e-direct Messaging	REC use
EHR	Reduce Measures
EHR Advantages	Registries
EHR Creates Errors	Regulations
EHR Support	Remote Access
EHR Upgrades	Requirement Issues
e-prescribing	Resources
Eye Contact	Rural
Failure	Specialists Not Participating
Fax	Standardization
Frontline Feedback	Staff
Government Programs	Staff Education
Has Not Changed Way I Practice	Stage 1
Ideal Medical Practice	Stage 2
Implementation	Survival
Incentives	System Updates/Upgrades
Independent	Time
Insurance	Vendors
Interface	Work Arounds
Interoperability	Workflows

Glossary

Affordable Care Act (ACA): "The comprehensive health care reform law enacted in March 2010. The law was enacted in two parts: The Patient Protection and Affordable Care Act was signed into law on March 23, 2010 and was amended by the Health Care and Education Reconciliation Act on March 30, 2010. The name 'Affordable Care Act' is used to refer to the final, amended version of the law" ("Glossary," n.d.).

Attestation: "The process by which an Eligible Professional (EP) or Eligible Hospital (EH) legally states through CMS that they've demonstrated Meaningful Use (MU) with Certified EHR Technology (CEHRT)" ("Technology Glossary," n.d.).

Clinical Decision Support (CDS): "Clinical decision support (CDS) provides clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. CDS encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support, and contextually relevant reference information, among other tools" ("Clinical Decision Support," n.d.).

Electronic Health Record System (EHR):

    Basic: A basic EHR system is defined as one that can record patient history and demographic information, record clinical notes, record medication and allergy lists, maintain patient problem lists, view imaging reports and has computerized prescription ordering capability (DesRoches, et al., 2008)

Meets Meaningful Use requirements: an EHR system that has the

functionality to meet the Meaningful Use requirements at each stage of the

Meaningful Use programs (e.g., Stage 1 requires eligible professional's (EP's)

EHRs to have the capability to meet 13 required core objectives, 5 menu

objectives from a list of 9 for a total of 18 objectives)

("Definition Stage 1," n.d.).

Eligible Professionals also referred to as Eligible Providers (EPs): "EPs under

the Medicare EHR Incentive Program include: doctors of medicine or osteopathy, doctors

of dental surgery or dental medicine, doctors of podiatry, doctors of optometry, and

chiropractors. A hospital-based EP furnishes substantially all of his or her Medicare-

covered professional services in a hospital inpatient or emergency room setting. Hospital-

based EPs are not eligible for incentive payments. EPs under the Medicaid EHR Incentive

Program are physicians (primarily doctors of medicine and doctors of osteopathy),

dentists, nurse practitioners, certified nurse midwives, and physician assistants practicing

in a Federally Qualified Health Center led by a physician assistant or Rural Health

Clinic" ("Technology Glossary," n.d.)

Health Information Technology (Health IT or HIT): "The application of

information processing involving both computer hardware and software that deals with

the storage, retrieval, sharing, and use of health care information, data, and knowledge for

communication and decision making" (Brailer & Thompson, 2004).

Health Information Technology for Economic and Clinical Health (HITECH) Act:

"Provides HHS with the authority to establish programs to improve health care quality, safety, and efficiency through the promotion of Health IT, including EHRs and private and secure electronic health information exchange" (Technology Glossary," n.d.).

Interoperability (also referred to as health information exchange (HIE)): "The ability of two or more systems or components to exchange information and *use* the information that has been exchanged" (IEEE, 1990). "Electronic HIE encompasses a broad array of strategies, technologies, types of exchange, and applications to share information" and is used to "facilitate better communication and enable more coordinated and connected care across the full continuum of health delivery and payment settings" ("Accelerating Health Information Exchange," n.d.).

Meaningful Use: "Sets specific objectives that Eligible Professionals (EPs) and Eligible Hospitals (EHs) must achieve to qualify for the CMS EHR Incentive Programs. Simply put, Meaningful Use (MU) means providers need to show they're using Certified EHR Technology (CEHRT) in ways that can be measured significantly in quality and in quantity" ("Technology Glossary," n.d.).

Medicare and Medicaid Meaningful Use Incentive Programs: "Provides incentive payments to Eligible Professionals (EPs) and Eligible Hospitals (EHs) as they demonstrate Meaningful Use (MU) of certified EHRs" ("Technology Glossary," n.d.).

Office of the National Coordinator for Health IT (ONC): Under the Department of Health and Human Services (HHS) this agency is "the principal federal entity charged with coordination of nationwide efforts to implement and use the most

advanced health information technology and the electronic exchange of health

information" and "is a resource to the entire health system to support the adoption of

Health IT and the promotion of health information exchange to improve health care"

("About ONC," n.d.).

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which they may not be subject to meaningful use non-participation penalties.
Eligible Providers exception, see http://www.cms.gov/Regulations-and-
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