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Overcoming Barriers to Implementing Electronic Health Records in Rural Primary Care Clinics

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Abstract

Medicare-eligible physicians at primary care practices (PCP) that did not implement an electronic health record (EHR) system by the end of 2015 face stiff penalties. One year prior to the 2015 deadline, approximately half of all primary clinics have not implemented a basic EHR system. The purpose of this phenomenology study was to explore rural primary care physicians and physician assistants' experiences regarding overcoming barriers to implementing EHRs. Complex adaptive systems formed the conceptual framework for this study. Data were collected through face-to-face interviews with a purposeful sample of 21 physicians and physician assistants across 2 rural PCPs in the southeastern region of Missouri. Participant perceptions were elicited regarding overcoming barriers to implementing EHRs systems as manadated by federal legislation. Interview questions were transcribed and processed through qualitative software to discern themes of how rural PCP physicians and physician assistants might overcome barriers to implementing electronic health records. Through the exploration of the narrative segments, 4 emergent themes were common among the participants including (a) limited finances to support EHRs, (b) health information exchange issues, (c) lack of business education, and (d) lack of change management at rural medical practices. This study may provide rural primary care physicians and administrators with strategies to promote the adoption of EHRs, provide cost efficient business services, and improve change management plans.

Keywords

Electronic Health Records, Primary Care Practices, Physician Group, Complex Adaptive Systems, Phenomenology

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Medicare-eligible physicians at primary care practices (PCP) that did not implement an electronic health record (EHR) system by the end of 2015 face stiff penalties. One year prior to the 2015 deadline, approximately half of all primary clinics have not implemented a basic EHR system. The purpose of this phenomenology study was to explore rural primary care physicians and physician assistants' experiences regarding overcoming barriers to implementing EHRs. Complex adaptive systems formed the conceptual framework for this study. Data were collected through face-to-face interviews with a purposeful sample of 21 physicians and physician assistants across 2 rural PCPs in the southeastern region of Missouri. Participant perceptions were elicited regarding overcoming barriers to implementing EHRs systems as manadated by federal legislation. Interview questions were transcribed and processed through qualitative software to discern themes of how rural PCP physicians and physician assistants might overcome barriers to implementing electronic health records. Through the exploration of the narrative segments, 4 emergent themes were common among the participants including (a) limited finances to support EHRs, (b) health information exchange issues, (c) lack of business education, and (d) lack of change management at rural medical practices. This study may provide rural primary care physicians and administrators with strategies to promote the adoption of EHRs, provide cost efficient business services, and improve change management plans. Keywords: Electronic Health Records, Primary Care Practices, Physician Group, Complex Adaptive Systems, Phenomenology

Introduction

Healthcare organizations implement electronic health records (EHRs) to improve the healthcare delivery, reduce costs, and comply with federal regulations (Kumar & Bauer, 2011). However, there is no guarantee comprehensive health information technology (HIT) investments are worth the time or money. HIT requires significant investments in equipment, software, training, maintenance, and changes in leadership, operations, and governance (Adler-Milstein & Bates, 2010). These factors illustrate the complexity of implementing HIT systems and why healthcare professionals doubt their large investment in HIT systems (Deutsch, Duftschmid, & Dorda, 2010). Under the present circumstances, EHR adoption may take up to 20 years to maximize market share (Aarts, 2012). Thus, there is a need to research EHR implementation barriers, which prevent rural primary care clinics from adopting EHRs.

Research, best practices, and ongoing EHR training and development leads to more EHR dissemination in primary care clinics (Duszak & Saunders, 2010).

In this qualitative phenomenological study, complex adaptive systems (CAS) formed the conceptual framework to explore rural primary care practice (PCP) physicians and physician assistants' lived experiences regarding overcoming barriers to implementing electronic health records. The targeted population was rural PCPs and physician assistants located at primary care clinics in the southeast region of Missouri. Using NVivo software to facilitate and capture collected information from the participants' face-to-face interviews, four themes emerged including: (a) lack of finances to support EHRs (b) health information exchange issues, (c) lack of business education, and (d) lack of change management in rural medical practices. The results may provide rural PCPs and general business leaders with information helpful for implementing EHR systems, improving change management strategies, and promoting change effectiveness in different organizations. We begin with the background of the EHRs.

Background of Electronic Health Records

EHRs emerged as a new technology in the 1970s (Gold, McLaughlin, Devers, Berenson, & Bovbjerg, 2012). By 2010, EHRs were a reality in a variety of healthcare locations in the United States (Gold et al., 2012). To encourage EHR implementation the government initiated the Health Information Technology for Economic and Clinical Health Act (HITECH), which provides incentive payments to physicians who use EHR in their interaction with Medicare and Medicaid. However, providers need to show "meaningful use" of the technology in ways where they are able to measure quality (Center for Medicare & Medicaid Services, 2013). In addition, PCP face stiff penalties if they failed to implement EHRs by 2015 (Kasiri, Sharda, & Asamoah, 2012), with harsher penalties to come in 2016 and 2017 (Gold et al., 2012). However, healthcare practitioners and healthcare businesses in primary care settings that do not have cultures focused on HIT development still struggle to see the benefits of EHRs (Classen & Bates, 2011). Healthcare companies lag behind in the development of EHR systems (Kivinen & Lammintakanen, 2012). Approximately half of all primary clinics had not implemented a basic EHR system by the end of 2015 (Office of the National Coordinator for Health Information Technology, 2015). Continuous improvement and understanding is critical as healthcare companies continue to transform and transition towards modern EHR technology (Bennett, Doub, & Selove, 2012). Therefore, we established the following research question: What are the rural primary care physicians and physician assistants' lived experiences and perceptions of complex adaptive systems as they pertain to overcoming barriers to implementing electronic health records?

Conceptual Framework

Business research remains limited in regard to management models for managing and developing competencies when using complex systems such as EHRs (Patel, Abramson, Edwards, Malhotra, & Kaushal, 2011). However, in order for organizations to benefit from HIT investments, they must develop their business competencies to take advantage of HITs (Adler-Milstein & Bates, 2010). The idea of healthcare businesses as CAS formed the theoretical framework for the study. The theory of CAS focuses on the interplay between multiple agents that work together and correspond in larger environments and the coevolution of systems and the environment (Vessey & Ward, 2013).

A healthcare system refers to a network of healthcare organizations that collectively supply healthcare needs similar to the buying firm. Four foci become evident when examining

CAS and EHRs implementation barriers: (a) environment, (b) internal mechanisms, (c) interaction of multiple agents, and (d) co-evolution (Vessey & Ward, 2013). The healthcare environment consists of multiple agents who exert demand for access to a patient's records, the patient's demand for EHRs, and payer source demand for EHRs bill processing. Internal mechanisms are communal health networks, internal technology, and technology diffusion mechanisms such as staff technology skills, knowledge, and the staff's ability to learn and adapt to systems and the environment. The multiple agents involved in the process include physicians, patients, insurance, third party payers, and other health information network exchanges. Co-evolution is two or more of these interdependent agents adapting to changes within a larger environment.

The CAS theory was used as the conceptual framework for this study to help in our understanding of components of the healthcare system and EHRs implementation barriers. Boustani, et al. (2010) recommended applying CAS principles to the healthcare industry because of the unpredictable nature of policy development which impedes the implementation of changes in healthcare delivery systems. McDaniel, Lanham, and Anderson (2009) further found value of CAS for understanding how to develop new solutions of coevolving healthcare problems. Many factors must come together as the rate of change increases, so that interconnected components work together, and organizations do not struggle as they adapt to change (Karwowski, 2012). Innovative technologies improve the company's ability to adapt and advance their capabilities but only if implemented correctly.

Complex healthcare organizations must quickly adapt, evolve, and adopt strategic models to continue to exist. Karwowski (2012) suggested that components within a complex system become unpredictable with mutually dependent interactions. Innovative companies have to manage complex relationships and communicate to multiple stakeholders to be successful in a major operational change. Communicating the value of a change allows the business to adapt and innovate. Moores (2010) suggested different structures in the organization impact multiple agents, technology, and the company's performance when communication breakdowns occur. Similar to Boustani et al. (2010), Moores (2010) suggested technology transformation is difficult in a business environment that is in a state of change. Moores (2010) further found flexibility in external relationships sustains lower cost strategies and increases the potential for successful implementation.

For healthcare organizations to reach their innovative potential, they have to balance chaos and stability (Carlisle & McMillan, 2006). Similarly, Karwowski (2012) suggested change doubles every decade in the mist of complexity and chaos and affects the company's ability to adapt to constant change. Mukherjee (2008) echoed complexity creates new structures within healthcare organizations. Healthcare organizations cannot dismiss EHR technology as it continues to advance, change, and evolve.

Through EHR systems, healthcare providers transfer massive amounts of data between numerous entities in complex healthcare systems (Merali, Papadopoulos, & Nadkarni, 2012). Merali et al. (2012) suggested emerging HIT have given rise to complexity, dynamism, uncertainty, and unpredictability. Gonnering (2014) found healthcare organizations have problems dealing with complexity. Similar to Gonnering (2014), Paina and Peters (2012) suggested leadership style and management practices influence the implementation of HIT in complex healthcare systems. As an organization implements an innovation, such as a new technology, the resulting effort exposes other organizational inefficiencies. Through the lens of CAS, we are better able to understand EHRs implementation barriers.

If done correctly, EHR implementation can result in significant cost and time savings for healthcare practices (Hatton, Schmidt, & Jelen, 2012). Physicians and administrators implement EHR systems to process large amounts of health data, improve efficiency, and reduce risks related to incomplete health data (Lluch, 2011). The complexity of EHRs cause

barriers with implementation and often lead to lower diffusion rates (Sicotte & Paré, 2010). The decision to adopt an EHR sometimes result in implementation barriers because EHRs are expensive to buy and maintain, especially in rural primary care clinics where there are unique funding and infrastructure limitations.

Prior research identified specific obstacles to adopting EHRs including (a) financial investments, (b) concerns about confidentiality, and (d) challenges in exchanging information electronically (Hatton et al., 2012; Sicotte, & Paré, 2010). The existing literature was limited on EHRs implementation barriers at rural primary care clinics. The gap in the literature review directed us to develop a research question to find out what barriers rural primary clinics faced when implementing and disseminating new technology. The results of this study are important for primary care clinics because it could help them to make better decision on how to overcome barriers when implementing, using, and diffusing EHR technology in their health care clinic.

Research Methods and Design

We chose qualitative phenomenological research. The goal of qualitative phenomenological research is to recognize and comprehensively define a particular occurrence based participants' account of their lived experiences (Yüksel & Yıldırım, 2015). A qualitative phenomenological design was best suited for the study because the goal was to understand the perceptions of participations related to overcoming barriers of EHR implementation through an exploration of their lived experiences. We considered and rejected an ethnographic design. Ethnographic researchers study the culture of a group by an extended interaction with a group (Marshall & Rossman, 2015). Our goal was not related to understanding the culture of the physician group but to understand their lived experiences.

Minimizing bias is what Moustakas (1994) referred to as *epoché*, or *bracketing*. Maintaining an unbiased attitude is not easy. Peredaryenko and Krauss (2013) suggested researchers might inject bias, particularly, if they have a strong familiarity with the context of a study. In our study, three of the primary researchers have substantive experience in healthcare data analytics that included over 50 collective years of healthcare experience. Two of the researchers have experience with managing and abstracting personal health information (PHI) including patient diagnoses from the health record to ensure confidentiality. One of these two has experience with reviewing medical record documentation including prognosis, treatment, and surgical notes to ensure clinical documentation meets standards for coding and quality health care metrics to mitigate risk of documentation validity. Finally, one researcher has an extensive hospital administration background. The researcher was involved in a project reviewing the implementation of an EHR system. Thus, we took steps to minimize bias. Following the strategy outlined by Petty, Thomson, and Stew (2012) we put aside our personal views of the phenomenon. To help focus on comments of participants, the primary interviewer used an interview protocol. An interview protocol, which standardizes the interview process helps avoid bias by reducing the risk that the researcher misses relevant information (Drabble, Trocki, Salcedo, Walker, & Korcha, 2015). The participants reviewed and confirmed that we had transcribed the interviews with their exact words and descriptions. In addition, we purposely chose a site and participants where we had no prior relationship. These strategies helped us acieve the state of *epoché*, which was necessary to block our biases and assumptions about the subject matter.

Data Collection

After IRB approval, we contacted a gatekeeper at each clinic and subsequently sent prospective participant an e-mail introducing the study. The study invitation asked for

volunteers and included informed consent forms. The informed consent letter stated that participants could leave the study at any time after selection with no consequences. There were no incentives for participating. Each rural PCP and physician assistant participant had have adopted a simple EHR and used the system for at least 6 months.

The purpose of our qualitative study was to explore the lived experiences and perceptions of rural primary care physicians and physician assistants related to overcoming barriers to implementing electronic health records. Thus, we used a purposive sample of 21 rural primary care physicians and physician assistants from two different primary care clinics in Missouri participated in the study. The purposive sampling technique was an appropriate strategy for selecting participants and sites to promote informational rich studies (Phillips-Pula, Strunk, & Pickler, 2011). Our sample size of 21 participants from 2 clinics allowed us to reach a state of saturation.

We collected participant data through long in-depth interviews; incorporating open-ended semi-structured questions (see Appendix A). The guiding research question was: what are the rural primary care physicians and physician assistants lived experiences and perceptions of complex adaptive systems as they pertain to overcoming barriers to implementing electronic health records? Our interview strategy followed the outline of Englander (2012), who suggested using reenactment, reflection, and reevaluating of the target phenomenon during the interview. Since our objective was to comprehend respondents' emotions, opinions, and understandings, the interview questions were open ended to encourage rural PCPs and physician assistants to describe their lived experiences to gain insight on overcoming barriers to implementing EHRs. In addition, interviews were audio recorded, transcribed for analysis, and formatted into matrices to uncover common factors. We continued interviews until we reached a point of data saturation. Mejia and Phelan (2014) described data saturation as the point where no new theoretical understanding is attainable with additional interviews. Saturation became a self-evident event when it was clear that additional interviews would reveal no new ideas.

Data Analysis

The participants responded to the open-ended questions during the interviews (see Appendix A). The participants did not have a copy of the questions before the interviews. The purpose of the open-ended questions was to explore the perceptions of PAs and PCPs regarding potential barriers to implementing EHR systems. We analyzed the participants' responses to the interview questions using QSR NVivo software. In addition, we analyzed the interview responses using the methods, procedures, and practices of phenomenological research analysis in conjunction with the modified van Kaam method (Moustakas, 1994). The specific steps were as follows: (a) list and group preliminary data, (b) reduce and eliminate superfluous data, (c) cluster and create core themes for the invariant constituents, (d) identify invariant constituents and themes by application., (e) validate the data, (f) construct an individual textural description of the experience, (g) construct an individual structural description of the experience, and (h) construct a textural-structural description of the meanings and essences of the experiences (Moustakas, 1994). After data collection from the interviews, we began the data analysis using the QSR NVivo software. Each participant had a unique numerical code to differentiate between participants and maintain their confidentiality. We used QSR NVivo software to incorporate the interview responses into emerging themes based on responses given during the interview. The analysis revealed common themes regarding barriers to EHR system implementation. Using the qualitative phenomenological approach provided us with the opportunity to understand the PAs and PCPs ideas and perceptions directly from their lived experience. A key feature of the QSR NVivo software was the capability to guarantee coding

was dependable consistent throughout the analytical process. We also checked whether the outcome of the analysis was consistent with the interview questions underlying the CAS theory, including results from the healthcare studies discussed in the literature review. Through this process of analysis, we formed conclusions based upon on our interpretation of the data.

Limitations

The limitations of the qualitative, phenomenological account include practical constraints. The first constraint was the unfeasibility of interviewing every rural primary care clinic. For this reason, the study results were not useful or do not generalize to every rural primary care clinic, in general. Second, there were only 21 participants in the investigation. Third, the review did not cover all stakeholders' experiences, including independent units such as health insurance and hospitals. The study limited all of these factors, which affect rural primary care clinics. The length of time to do the study was also a limitation because of the IRB timeline approval. Finally, the lens through which we observed rural PCPs and physician assistants' responses was a barrier even though the focus was on overcoming barriers to implementing EHRs and not changing health care systems at the community and state level.

Findings

An EHR system implementation is a complex process that involes multiple internal and external factors. Thus,we used the CAS theory to help us understand the themes as a means to conceptualize thoughts and ideas from rural PCP and physicians' assistants regarding how rural primary care clinics overcome barriers to implementing electronic health records. Four themes emerged from the inductive analysis of the participants' data including (a) lack of finances to support EHRs, (b) health information exchange issues, (c) lack of business education, and (d) lack of change management at rural medical practices.

The four themes that emerged helped us develop the essence of the phenomenon of overcoming barriers to implementation of medical records. Patton (2015) describes the essence as the core meaning of the phenomena. As described by Van Manen (1990) phenomenology is a process where a researcher systematicallyuncover the meaningful structures of lived experiences The essence of the themes focused on barriers unique to rural health medicine and medical education in general. We arranged the findings section by these themes.

Theme 1: Lack of Finances to Support EHRs

A number of physicians perceive EHRs as hard to use and expensive (Ajami, Ketabi, Isfhani, & Heidari, 2011). EHR adoption costs make it more challenging for smaller healthcare providers (Adler-Milstein & Bates, 2010). Participants indicated that they were aware of funding opportunities. However, participants indicated the actual amount available to healthcare providers was insufficient. Participants also found the threshold for incentive payments, meaningful use, was difficult to document. The high costs of EHR systems implementation and ongoing development and maintenance pose a higher risk for smaller providers (Lluch, 2011). The participants statements included:

- "Rural practices may not see the financial benefits of EHRs for a long time. This creates operating issues for the smaller rural practices."
- "Smaller rural medical practices cannot afford to buy EHR systems, and pay for ongoing costs and maintenance when they have to reduce patient flow to accommodate the learning curve of implementing new technology."

- "The government needs to regulate EHR system costs because there are already monopolies."

The financial burdens of buying and implementing EHR systems as well as the ongoing development and maintenance of the systems, and the uncertainty of medical practices return on investment does create barriers for rural primary care clinics. It is difficult to deliver medical care that is less expensive while increasing quality of care in highly complex rural primary care businesses. Rural primary care clinics stuggle to find enough money to buy and maintian EHRs, so more funding should be allocated to help smaller practices finance EHRs.

Theme 2: Problems with Health Information Exchange

The exchange of electronic health information plays a large role in healthcare businesses (Adler-Milstein & Bates, 2010). The Health Information Exchange (HIE) exchanges electronic health information between organizations related to a patient's healthcare and status (eHealth Initiative, 2012). Repeatedly electronically communicated data is incomplete (Ross, Schilling, Fernald, Davidson, & West, 2010). Electronic health records enables health information to go through several providers and software programs (Ajami et al., 2011). For this reason, there is a need to support and develop EHR systems on a nationwide level (eHealth Initiative, 2012). The participants' statements were:

- "Rural communication companies were not prepared for EHR systems. Our Internet could not support our EHR system at first. It causes a lot of down time and stress for our employees."
- "It would be better if everyone had one unified EHR system. Our system does not interface well with other EHR systems. It creates frustration and extended wait times when trying to get a patient's health information."

EHR systems need to be more universal. They do not "talk to each other," so electronic health data is frequently incomplete. The quality of care declines when rural primary care clinics have problems getting a patient's electronic health data quickly.

Theme 3: Lack of Business Education

Participants acknowledged the lack of any formal business training received in medical school. Weingarten, Schindler, Siegel, and Landau (2013) that a majority of medical professionals do not acquire formal business training while attending medical school. Additionally, Iezzoni and El-Badri (2011) asserted business education is essential to HITECH, American Recovery and Reinvestment Act (ARRA), and Patients Protection and Affordable Care Act (PPACA) requirements of measuring quality and accountability in healthcare organizations. The participants statements included:

- "Rural primary care practices need to offer more training and hands on before they go live with EHR systems. I feel like we did not have enough training or hands on when we went live with our EHR. It would have been much easier and less stressful if we had had a week of mock practice."
- "The computer programs need to be more users friendly, and we need more education and hands on training before using EHR systems."

There were many concerns observed about training and using complicated EHR software programs. Business training at medical schools would allow the medical staff be more

productive and confident. Diffusion of EHRs would improve the quality of healthcare and make primary care clinics more sustainable.

Theme 4: Lack of Change Management in Rural Medical Businesses

Healthcare organizations implement new technology solutions to streamline business activities, increase efficiency, achieve organizational objectives, and maintain their future (Kumar & Bauer, 2011). New technology opens many possibilities to solve future problems and alleviates spending pressures (Astolfi, Lorenzoni, & Oderkirk, 2012). However, Smith (2011) indicated that leadership is the missing element in many IT implementation development efforts. The participant's statements are:

- "EHRs have to be supported from the top down to be successful."
- "Managers have to take ownership of change to get ownership from everyone. It has to start at the top to trickle down."
- "People do not like change, so they resist it."

Primary care clinics continue to struggle with EHR implementation when stakeholders, including managers, physicians, and staff do not support it. Everyone must to be onboard for EHR implementation to be sucessful. Complete transformation is needed to buy in and support EHR implementation.

The transition to EHR systems affects the core business systems of every health care provider. The collaboration of health care providers and leaders might enhance the degree of operational, technological, clinical, and financial success. Exploring how users come to accept and use EHR new systems are an important aspect of transformation that can explain the success or failure of a new EHR system. Adopting the recommendations from this study might enable health care providers and healthcare leaders to mitigate disruptions, and document best practices while capturing more accurate and consistent health information about the severity of patients' conditions using the EHR new system.

Discussion and Recommendations

The goal of the PPACA was to expand insurance coverage, transform organizational structures, control healthcare costs, provide quality of care, and prevent healthcare fraud through technology innovation (Gable, 2011). The ARRA goal was to motivate the healthcare industry to increase EHR systems adoptions through incentive programs (Jain, Seidman, & Blumenthal, 2011). We conducted a qualitative phenomenological study by exploring rural primary care physicians and physician assistants' experiences regarding overcoming barriers to implementing EHRs. We gathered data from 21 participants through face-to-face interviews. Four themes emerged from the interviews: (a) lack of finances to support EHRs (b) health information exchange issues, (c) lack of business education, and (d) lack of change management in rural medical practices. These emergent themes may help the healthcare industry and healthcare leaders understand that deficiencies exist under the ARRA, HITECH, and PPACA legislation, and many questions and problems continue to be unaddressed. The results from the study may also provide rural PCPs and general business leaders with information helpful for improving change management strategies and promoting change effectiveness. In addition, it is important for healthcare administrators to ensure business leaders have the necessary tools for an organizational change effort when considering a new change initiative to reduce resistance. The recommendations that emerged from our study:

1. EHR system protocol needs to be standardized.
2. EHR systems must be financially feasible for rural primary care clinics.
3. The development of healthcare delivery models should support individual healthcare populations unique to rural healthcare organizations.
4. Medical reimbursement should be geared towards an individual billing system and quality elements and not based solely on positive and negative outcomes of patient care.
5. Communication companies in rural areas should be mandated to improve the quality of Internet services to rural healthcare clinics.
6. Business courses should be a part of the curriculum in medical school to help healthcare providers understand the business of healthcare.

The rural primary care physicians, physician assistants, general business leaders, and stakeholders can apply the recommendation from the study to promote the implementation, adoption, and diffusion of EHRs to create innovative solutions for organizational problems as well as improve responsiveness to customer needs, and lower costs.

Summary and Study Conclusions

The participants perceptions gathered from this qualitative phenomenological research included unfavorable opinions of ARRA, HITECH, and PPACA legislation. The emergent themes may help the healthcare industry and healthcare leaders to understand that deficiencies exist under the ARRA, HITECH, and PPACA legislation, but many questions and problems continue to be unaddressed. The rural PCPs and physician assistants are the responsible providers in regards to the health of their patients, and they believe the ARRA, HITECH, and PPACA legislation threaten their autonomy as a healthcare decision makers and providers. The increased regulatory climate of government in healthcare and the lack of diffusion of information have increased the rural PCPs and physician assistants' frustration and uncertainty.

While rural PCPs and physician assistants understand that traditional business models no longer work and there is a need to change, they expressed concerns that the solo primary healthcare practices may not be a feasible healthcare model in the future due to financial limitation. ARRA, HITECH, and PPACA legislation focuses is on healthcare populations who require innovative healthcare delivery models and are quality focused, patient centered, and cost effective, but the model does not consider barriers rural providers face with rural populations. Dissemination of information and communication with gatekeepers would relieve confusion and be beneficial in gathering information from the physician and physician assistants' population on overcoming barriers to EHRs implementation. The CASs in the literature review was applicable in a rural setting because of the complex nature, the financial constraints, the lack of knowledge, and the diversity of medical practices. Healthcare organizations continuously evolve and change rapidly underneath the ARRA, HITECH, and PPACA legislation.

Several themes from this study that warrant further research. Replication of the study in different regions of the United States would be valuable in determining similarities or differences in rural PCPs and physician assistants' perceptions in comparison to those found in Southeast region of Missouri. Additionally, replication of this study in different healthcare specialty practices would be valuable in determining similarities or differences in comparison to those found in rural PCPs. Other areas to consider may be exploring and examining changes in healthcare providers' attitudes toward implementing and using EHRs five years after EHR implementation.

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Appendix A: Interview Questions

1. What are your experiences related to barriers to implementing electronic health records systems?
2. What are your experiences related to adapting and learning about internal mechanisms, such as shared health networks, internal technology, and technology diffusion mechanisms?
3. What are your experiences working together with others (such as administrators and physicians) to reduce barriers and increase electronic health records adoption rates?
4. How do environmental factors, such as consumer health marketplaces, and the demand for access to patients' health records affect the barriers you experience related to the transition

to EHR?
5. How do other environmental factors, such as the patient's demand and payer source demand for the EHR bill processing affect the barriers you experienced in the transition to EHR?
6. What else you would like to add related to your experiences in transitioning to EHR?

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