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Public Health Providers' Perceptions of Electronic Health Records in a Disaster

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Abstract

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MHA, Central Michigan University, 2003

BSN, Prairie View University, 1997

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Health

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Abstract

The introduction of federal initiatives and incentives regarding health information technology fostered a movement towards the adoption of electronic health records (EHR). Implementation of EHRs sparked discussions among healthcare providers, patients, and others about the benefits or challenges of the move from the traditional paper method to the electronic version in healthcare settings. A knowledge gap in research involving the usefulness of EHRs and their impact to the delivery of care in other settings exists. The purpose of this qualitative study was to explore public health providers' perceptions of the meaningful use of EHRs in a disaster setting. Study participants were public health providers from Louisiana recruited via criterion sampling and snowball sampling. A qualitative, phenomenological design was used to gain understanding of the public health providers' experiences with and perceptions of EHRs in a disaster setting. Data were collected from 7 public health providers using in-depth interviews and reflective journal notes. The data were analyzed for patterns and themes using the hermeneutic circle method. The study findings indicate that individuals want to be involved in designing their system and adjusting workflow in the workplace setting. The majority of participants concluded that EHR systems are beneficial in the disaster setting, but there were no impacts to improving health outcomes. The findings provide policymakers, public health departments, healthcare providers, emergency managers, and communities needed information on the potential impact of EHRs in the disaster setting on improving safe and effective care.

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Dedication

In memory of my father, who elaborated on the importance of education, and my mother, for her continued love and support throughout the arduous process, I am most grateful for the both of you. I am thankful for Collins who started with me on this journey from the first day and encouraged me to reach for my dream. Thank you to my sisters and my brother for pushing me to go further to make the dream possible for our family. I would like to dedicate this accomplishment to all of Houston and surrounding areas recovering from Hurricane Harvey. We will come back stronger than before.

Acknowledgments

My sincere gratitude and acknowledgement goes to my committee chair, Dr. Suzanne Richins, and other committee member, Dr. Jim Goes, for your review and feedback. I am most humbly thankful for your support.

I would like to thank the volunteers that participated in the pilot study and my colleagues who helped me with the pilot study. I also would like to extend a heartfelt thanks to all of the participants. The physicians, nurse practitioners, and nurses do a phenomenal job taking care of individuals who are displaced requiring medical assistance. I am also grateful for all of those who silently pushed me to complete this journey and those who shouted out loud that I could accomplish my goals.

Finally yet importantly, I would like to thank God for allowing me the opportunity to do great things. I experienced challenges throughout this journey but I am glad to finally say, I made it.

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Chapter 1: Introduction to the Study

Americans visit their physicians and hospitals regularly to receive treatment and healthcare services. U.S. healthcare services are a complex system, and medical information prepared using the traditional paper method has the potential to suffer damage from improper storage, offers limited providers' access to important health information because of the difficulty sharing it, and causes concerns about the delivery of care because of illegible handwriting (Menachemi & Collum, 2011). Treatment by healthcare providers who use paper records translates into fragmented and costly healthcare and the lack of pertinent health information that can impede the progress of an individual's overall health (Fernandez-Aleman, Senor, Lozoya, & Toval, 2013; U.S. Department of Health and Human Services, Office of National Coordinator for Health Information Technology [ONC], 2014). Electronic health records (EHR) can help to eliminate medication errors, multiple hospital admissions, and duplicate testing, and may help improve health outcomes and patient care (Fernandez-Aleman et al., 2013; ONC, 2014).

Healthcare providers remain divided in their understandings of the potential value of EHRs and the proposed goal of achieving successful improvements and benefits in care delivery (Blumenthal & Tavenner, 2010). Moreover, there is disagreement about the effectiveness of HIT among health researchers (Kellermann & Jones, 2013). Appari, Johnson, and Anthony (2013) discussed the need for research examining HIT benefits and the lack of research related to the benefits of meaningful use.

While research on HIT benefits does exist, other researchers have highlighted the lack of empirical research on HIT benefits and the need for further understanding (Audet et al., 2014; Cresswell & Sheikh, 2013; Menachemi & Collum, 2011; Wang & Biedermann, 2012). In a review of the literature, I found a lack of research that supports the effectiveness and usefulness of EHRs (Audet et al., 2014; Cresswell & Sheikh, 2013; Kellermann & Jones, 2013; Menachemi & Collum, 2011; Wang & Biedermann, 2012). I conducted this study to address gaps in the literature related to the perspectives of health providers in other nontraditional healthcare settings, such as disaster settings, in the adoption and implementation of information technology systems. As disaster planning becomes incorporated into everyday preparedness, it is important to explore the usefulness and practicality of EHRs outside of the traditional healthcare setting (Horahan, Morchel, Raheem, & Stevens, 2014).

Disasters can create challenges for medically fragile patients and those seriously injured. Communities become quickly overwhelmed and suffer a major loss when the medical infrastructure is impacted and the ability to respond exceeds the local area's capability. Providers may find it difficult to meet the medical needs of patients evacuated from an impacted area to provide continuity of care while adjusting to limited resources in a large-scale disaster (Dries et al., 2014).

Although prior researchers have demonstrated the need for information technology as part of disaster health response, gaps exist in the literature regarding the interrupted medical care services experienced by providers and patients without EHR systems. In addition, the literature lacks details about the effects of the fragmented

healthcare services received by patients during this time (Abir, Mostashari, Atwal, & Lurie, 2012; Bookman & Zane, 2013; Brown et al., 2007; Callaway et al., 2012; Chan et al., 2011; Culley, 2011).

Therefore, the problem I addressed in this study is that the usage of EHR systems in a disaster setting is unknown. My intent was to assess the benefits and challenges associated with the use of EHR systems in a disaster setting, as perceived by public health providers, to understand any possible effects on healthcare outcomes. The methodology for this study consisted of a qualitative, phenomenological design.

Background of the Study

The federal government's push to improve safety, quality, and efficiency challenges healthcare providers and facilities to adopt and implement health information systems. Improved care coordination of services through information sharing maximizes the performance of the nation's healthcare delivery by addressing challenges to disease management (Fernandez-Aleman et al., 2013; ONC, 2014). Despite the efforts, the adoption and implementation of electronic health information has been slow across the country (ONC, 2014).

It is unclear why adoption and implementation rates of EHR systems are slow (Nguyen, et al., 2014). If they understand the usefulness of EHRs, then providers may be more likely to use EHR systems effectively. It is not known if EHR systems are problematic or beneficial in other care settings, outside of the traditional clinic and healthcare settings (Middleton et al., 2013). There is a lack of evidence-based research available on the usefulness of these systems in most clinical practices (Hamid & Cline,

2013; Nguyen et al., 2014). As a result, little is known about the usefulness of EHRs in a disaster setting (Aung & Whitaker, 2013; DeMers et al., 2013; Horahan et al., 2014).

Provider User Acceptance

Researchers have suggested one of the challenges to EHR systems is user acceptance. Gaining acceptance from providers is crucial to the adoption and implementation of EHR systems (Hamid & Cline, 2013; Lakbala & Dinderloo, 2014). Although some physician practices and clinical settings have adopted these systems, many others have not. Despite the fact that most HIT end users include physicians, nurses, other healthcare professionals, and administrative staff, the physicians' influence impacts other users' engagement with the system (Lakbala & Dinderloo, 2014; Noblin et al., 2013).

It is important to understand how user acceptance may affect adoption and implementation (King, Patel, Jamoom, & Furukawa, 2014; Noblin et al., 2013). Although some users accept EHR systems in their practices, often their intent to use the systems to the fullest potential is low or they do not use all of the system's functionalities (Noblin et al., 2013). Integrating EHR systems into complex environments can have both positive and negative impacts for providers, staff, and patients. The lack of fully developed information technology competencies, policies, and evaluation frameworks requires more researchers to develop a robust understanding of the integration of EHR systems into various work environments.

Hamid and Cline (2013) suggested that the perceived lack of usefulness of EHR systems influenced providers' adoption and use intention. There is a lack of research on

the challenges and barriers to successful implementation of EHR systems in other settings outside of the traditional clinic and hospital setting. Therefore, studies such as mine are needed to understand the challenges and barriers from the user's perspective.

Disaster Challenges

Disasters pose a public health risk to communities, threatening the population's health (Malilay et al., 2014). Although disasters are unpredictable, preparation minimizes the danger and facilitates strengthened emergency response efforts. Effective disaster management enforces the need for information sharing and communication flow to support decision-making in a complex environment (Dorasamy, Raman, & Kaliannan, 2013).

The role of public health in a disaster response involves more than conducting surveillance for disease outbreaks, assessing health interventions, recognizing risks, and determining impacts (Gibson, Theadore, & Jellison, 2012; Malilay et al., 2014). Public health emergency preparedness involves public health services' ability to coordinate with healthcare systems, communities, and individuals to prepare for public health emergencies that affect the population's health. Preparedness entails the capability to prevent, protect, respond, and recover from health emergencies (Gibson et al., 2012).

According to Owens and Martsolf (2014), most individuals do not prepare for evacuation and often do not prepare to manage their chronic illnesses while residing away from home. As of result of Hurricane Katrina, a number of issues complicated the disaster response and challenged the provision of healthcare. Many people left behind their medications, medical records, and experienced a delay in treatments such as dialysis

and chemotherapy. The destruction of the healthcare infrastructure breached the continuity of care for individuals with chronic conditions. The aftermath of the disaster also contributed to displacement of many healthcare providers (Arrieta, Foreman, Crook, & Icenogle, 2009).

In 2010, financial damage from disasters around the world escalated to $110 billion, contributing to an estimated 300,000 people killed and over 200 million affected. The threat to human life resulting from public health emergencies warrants effective management of disasters through an integrated system (Dorasamy et al., 2013). Medical management of special populations in a complex setting such as shelters is essential in preventing death and rapidly declining illnesses in individuals treated outside of a healthcare facility (Dries et al., 2014).

Recent disasters such as hurricanes, tsunamis, earthquakes, and terrorist attacks have highlighted the need for healthcare providers to make better clinical decisions when providing medical care and treatment to survivors in the midst of chaos. Widespread adoption of information technology in the disaster setting presents challenges due to an absence of evidence on improved response capabilities, costs of such systems, and provider acceptance (Chan et al., 2011). However, as a result of inaccessible health records, healthcare providers in disaster settings have encountered problems treating patients with chronic health conditions (Arrieta, Foreman, Crook, & Icenogle, 2012).

Arrieta, Foreman, Crook, and Icenogle (2012) discussed the need for access to EHRs in caring for individuals with chronic diseases in the aftermath of a disaster in primary care settings. Abir, Mostashari, Atwal, and Lurie (2012) discussed how having

access to EHRs proved valuable in the hospital systems and their off-site locations in both Joplin, Missouri and Harrisburg, Illinois after tornados struck both cities within 1 year of each other. Callaway et al. (2012) conducted a study of a mobile health technology application in Haiti to evaluate the benefits of using the system for disaster health response. The authors studied the effects of the hand-held technology application and did not assess the perceptions of the end-users or the impacts to the delivery of healthcare (Callaway et al., 2012).

Brown et al. (2007) used a retrospective study to research the use of EHRs in the Veterans Affairs (VA) setting during the Hurricane Katrina disaster. The researchers' findings showed that access to EHRs influenced the care received by patients and the services provided by clinicians in maintaining continuity of care. However, their conclusion excluded the perceptions of healthcare providers not associated with the VA system and did not account for veterans who received services outside of the VA system (Brown et al., 2007).

Technological advancements play an integral role in disaster response. Integrating HIT into the disaster planning, response, and recovery can affect health outcomes (Jan & Lurie, 2012; Malilay et al., 2014). The accessibility and availability of records may improve disaster response capabilities by enabling information sharing among healthcare facilities and ensuring access to health history information (Owens & Martsolf, 2014). In this study, my intent was to research how public health providers perceive the use of EHRs in a disaster setting.

Problem Statement

There are challenges to implementing EHR systems in healthcare organizations, and their usefulness is not well known (Bonner, 2010; Nguyen, Bellucci, & Nguyen, 2014). Despite the push to adopt and implement HITs in the United States, there remains a gap in the adoption and implementation of EHR systems, and providers and end users have expressed frustration with them (Buntin, Burke, Hoaglin, & Blumenthal, 2011; Hamid & Cline, 2013; Nambisan, Kreps, & Polit, 2013). Nambisan, Kreps, and Polit (2013) insisted on a need for better understanding influences on the adoption and successful implementation of EHR system in the wake of financial incentives and governmental policies.

There is a discrepancy in understandings of the relative usefulness of EHRs between healthcare providers and administrators. The benefits or barriers associated with the use of EHR systems in a disaster setting are not known. In previous studies, researchers have focused more on the use of specific technological tools such as radiology order entry and handheld wireless devices in a disaster setting and less on providers' perspectives on the usability of EHR systems in this setting before implementation (Bookman & Zane, 2013; DeMers et al., 2013).

When reviewing the literature, I found that researchers indicated physician resistance as a major factor limiting long-term adoption of EHR systems in hospital and outpatient settings (Hamid & Cline, 2013; Love et al., 2013; Noblin et al., 2013). The slow adoption of EHR systems among providers warrants the need to evaluate the actual

and perceived benefits (Hamid & Cline, 2013; Lakbala & Dindarloo, 2014; Love et al., 2012).

To date, researchers have focused on access to EHR systems in healthcare settings during a disaster (Abir et al., 2012). Some impediments to successfully implementing and understanding the role of EHR systems include a lack of evidence showing improved quality and patient safety outcomes (Noblin et al., 2013; Patel & Kannampallil, 2014). Other challenges to implementing EHR systems include deficiencies in workflow and process indicators, communication, and usability (Kuziemsky, 2015; Noblin et al., 2013; Patel & Kannampallil, 2014).

Purpose Statement

The purpose of this qualitative, phenomenological study was to analyze and increase understanding of the perceptions of the public health providers regarding the benefits and challenges of using EHR systems, and of how these perceptions influence the successful adoption and implementation of EHR systems. Specifically, I sought to produce results that could inform future EHR development and to identify effective adoption and implementation strategies by exploring the perceptions of public health providers before implementation of EHR systems in a disaster setting. The study involved in-depth interviews to examine the impact to the delivery of care without having access to medical records in a disaster setting. Researchers have previously focused on the use of EHRs in healthcare facilities such as hospitals and clinics for routine operations rather than its usefulness in a disaster setting (Abir et al., 2012). Chapter 2

will include detailed information regarding the gaps in studies that address EHR use in a disaster setting.

Limited research exists regarding the usefulness of EMRs in a disaster setting (Abir et al., 2012; Bookman & Zane, 2013; Chan et al., 2011; Culley, 2011). The findings of this study may provide information needed by healthcare leaders and providers in making decisions about implementing and using electronic records. The data I gathered regarding the lived experiences of public health providers working in a shelter will help to healthcare leaders and providers understand the challenges and encourage discussions between policymakers, public health departments, healthcare providers, emergency managers, and healthcare communities regarding effective patient care and the successful implementation of EHR systems.

Research Question

What are the lived experiences of public health providers in Louisiana regarding the meaningful use of EHRs in a disaster setting?

Sub-Questions

1. What are the reasons, if any, that public health providers perceive the use of electronic health records as useful?
2. What do public health providers perceive as barriers to providing healthcare during emergencies and disasters?
3. What positive and negative experiences, if any, have public health providers encountered that may affect their clinical decisions in providing patient care in the absence of electronic health records?

Conceptual Framework

I used interactive sociotechnical analysis (ITSA) as the conceptual framework for this study. The framework highlights the effect of interactions between innovative technologies and the existing sociotechnical environment. It is a guiding framework to explore the implementation of information systems and to assist researchers in anticipating unintended consequences. Social and technical interactions include factors such as the influences of workflow, culture, social interactions, and technologies within a complex environment, as displayed in Figure 1 (Harrison, Koppel, & Bar-Lev, 2007).

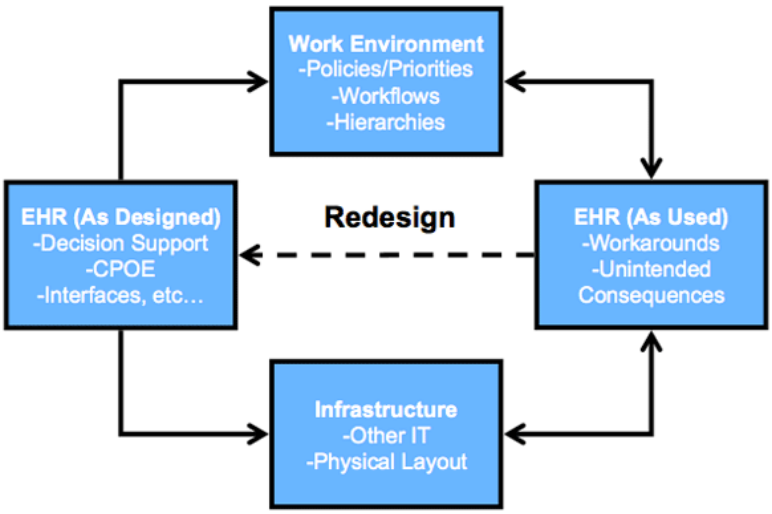

Figure 1. Elements of the Interactive Sociotechnical Analysis framework. Adapted Reprinted from "Guide to Reducing Unintended Consequences of Electronic Health Records" by Agency for Healthcare Research and Quality, 2011.

In their discussion of the ITSA framework, Harrison, Koppel, and Bar-Lev (2007) focused on feedback loops that they described as recursive processes. The framework includes four features to explore the interactions of innovative technology systems, employees, and the organization. The features are (a) actual uses of HIT versus uses of

planned or intended use by the designers or managers, (b) the influence of HIT use on the work environment, (c) users' renegotiation and reinterpretation of HIT features, and (d) interaction and interdependence among social and technical systems subcomponents (Harrison et al., 2007).

A negative encounter between the implementation of EHRs and the physical work environment can lead to unintended consequences (Harrison et al., 2007). Because of the complex work environment, such as in a disaster setting, unintended consequences can lead to challenges in patient safety, barriers to implementation, and communication failures between providers and patients (Harrison et al., 2007; Harrison & Koppel, 2010). The need for managers and IT specialists to understand the interaction of the physical environment and the EHR system in a disaster setting, such as working in a temporary shelter infrastructure, is important to improving the system and the implementation of the system (Bonner, Simons, Parker, Yano, & Kirchner, 2010; Harrison et al., 2007). Incorporating feedback from the public health providers, the end users, can aid to alleviate workarounds and frustration, especially in a unique setting (Agency for Healthcare Research and Quality, 2011; Harrison et al., 2007).

Cady and Finkelstein (2012) used the ITSA framework to evaluate the workflow of triage nurses working in a pediatric clinic before and after a delivery-centric intervention. The researchers suggested that the framework is useful in complex adaptive systems such as healthcare systems because of the unpredictable environment and the potential for unintended consequences (Cady & Finkelstein, 2012). Sitting and Singh (2010) used the ITSA framework along with other conceptual models as a basis for

further development of their conceptual model. Their use of the framework enabled the authors to address sociotechnical barriers in analyzing HIT implementation in a complex healthcare environment (Sitting & Singh, 2010).

Harrison et al. (2007) suggested that from their perspective, there was a scholarly need to concentrate on the work environment encompassing the existing complexities of the social system. The implementation of new technology can depend on current systems and social interactions (Harrison et al., 2007). By understanding user acceptance and identifying barriers by exploring the perceptions of public health providers, I sought to explore the usefulness of EHRs in a disaster setting before implementation and further development of such systems.

The use of a conceptual framework can guide researchers in interpreting the data (Lopez & Willis, 2004). I used the ITSA framework when collecting data, developing the interview questions, and interpreting the data. I analyzed the participants' responses from the interview questions, journal notes, and literature review utilizing the elements of the conceptual framework.

The participants' past experiences working in a disaster setting provided an understanding of the work environment and how EHR systems positively or negatively influenced patient quality and safety. The providers described how their patient interactions and the layout of the infrastructure could potentially affect the implementation of technology and flow of information. The daily experiences of the public health providers might help to determine the feasibility of incorporating information technology into this type of setting. The participants' experiences may

highlight the implications of information technology implementation in this context or support the decision not to implement an EHR system.

Definition of Terms

Disasters: Events that disrupt a community's ability to use their resources and to extend to potential damage and loss. The damage can affect human life, material, economic, and environmental sustainability (Federal Emergency Management Agency [FEMA], 2008; World Health Organization [WHO], 2007).

Emergency: A situation requiring a declaration in a community where an unexpected event occurs (FEMA, 2008; WHO, 2007). In this study, emergencies and disasters represent the same meaning.

Health information exchange: The transfer of health information between organizations to enable safe and effective care (ONC, 2014).

Meaningful use: The use of EHRs to optimize quality, safety, and care coordination (ONC, 2015).

Significance of the Study

Disasters happen without warning and cause significant damage. Since most disasters are not preventable, it is important to improve preparation for disaster response through access to knowledge and information (Dorasamy et al., 2013). The results of this study may equip policymakers, healthcare providers, public health officials, emergency managers, and communities with a better understanding of the relationships between social, environmental, and technical factors that could potentially influence implementation and adoption behaviors (Creswell & Sheikh, 2013). The findings from

the study could potentially assist emergency managers, healthcare providers, and public health officials streamline EHR implementation efforts by providing information they can use to understand the information technology needs of healthcare providers in a disaster setting.

Healthcare organization leaders could use the responses from this study to evaluate workflow operations, assess the need for robust network systems, modify EHR systems, and gain knowledge on best practices for unique healthcare settings such as shelters. Feedback from the end users of the system can assist with planning for the evaluation process to incorporate workflow and emerging data (Cresswell et al., 2013).

Information from the study might help to inform leaders working to develop stronger policy and practices for successful implementation. Further, the findings from the study could help organizational leaders decide if introducing EHR systems in a disaster setting is feasible, and if so, how to incorporate a supportive infrastructure for the new technology. This study may provide a better understanding of whether EHR use during disasters will improve or bring about challenges when providing care.

Nature of the Study

In this study, I used a qualitative, phenomenological approach to analyze how individuals interact with technology and exist in social systems in a complex environment such as a disaster setting. Because disasters occur infrequently, a phenomenological study to elicit lived experiences through the participants' descriptions seemed most appropriate given the purpose of this study. The phenomenological approach allowed me to study individuals' descriptions of their experiences, perceptions, and feelings about the

phenomenon by recreating their truths. The findings of the study helped to clarify how the work environment and infrastructure influence EHR implementation versus preconceived assumptions in answering the research question (see Patton, 2002).

I collected rich data via face-to-face interviews with selected participants. The interviews consisted of open-ended questions posed to interested public health providers who worked in a disaster shelter in Louisiana. The analysis included examination of transcripts from these interviews. The themes and categories that emerged from the data helped to shape my interpretation of the data. The use of phenomenology as a research method provided an opportunity to study the meaning and the structure of the lived experiences as told firsthand by the participants (see Creswell, 2013; Patton, 2002).

The phenomenological approach was appropriate because it enabled me to focus on human behavior and experiences of a past event. My personal beliefs and assumptions resulting from my experiences working in a disaster setting shaped my intent to use an inductive approach to understand public health providers' perceptions of the usefulness of EHR systems in this type of setting (see Creswell, 2009; Maxwell, 2013). The participants discussed their experiences and perspectives on how they provided treatment to patients in shelters without access to medical records. The phenomenological approach guides the researcher to studying meaning and structure of the phenomenon from different perspectives (Patton, 2015).

I considered using ethnography for this study. Ethnography highlights the study of cultures using observation. The ethnographic approach enables the researcher to study organizations and observe interactions of the people in the field setting. The approach

was rejected because of the need to observe groups participating in the event to become part of the culture over an extended period and the topic of this study (see Creswell, 2009; Patton, 2015).

My goal was to understand how healthcare providers felt about the phenomenon in their words rather than to develop a theory as in grounded theory. In the case study approach, the researcher is confined to a particular location, while in a phenomenological study the researcher is not bound by location or time (see Creswell, 2013). In narrative analysis, the researcher focuses on the stories of the participant's, which would be appropriate for exploring the experiences of the patients who received care in the shelter, but was not suitable for the purposes of this study. In essence, I used a phenomenological approach because it enabled me to gather direct responses from the selected participants (see Creswell, 2013; Patton, 2015).

I did not use quantitative design for this study because I sought to elicit responses that required descriptions and depth and not statistical data. Instead of beginning with a previous theory to shape their understandings of the reality of the phenomenon, in a qualitative design, researchers can gather meaning about the research topic through interaction with the participants (see Creswell, 2009). The quantitative method does not allow the participants to explain their perspectives or experiences in a natural setting (see Reynolds, 2007). Instead of generalizing the findings to fit a population as in quantitative survey and experimental research, I employed a phenomenological study to capture the viewpoints of the participants and identify the transferability of those feelings and experiences to others similar to them (see Creswell, 2009).

Assumptions

In this study, I assumed that public health providers provided their true perceptions of the positive and negative outcomes of EHR use. Other assumptions were associated with the elements of the ITSA framework. According to the ITSA framework, the end user is part of the feedback loop. The end user can describe the intended use versus the anticipated used as designated by managers and information technology designers (Harrison et al., 2007). In an attempt to avoid biased responses, I ensured participants that their identities would not be revealed, and I maintained confidentially throughout the study. The participants were given the option to withdraw from the study at any time.

In Louisiana, public health providers—both physicians and nurses—provide healthcare to individuals who have evacuated during a disaster. The public healthcare providers manage the medical shelters outside of the hospital setting. The nurses assess and provide triage for individuals admitted to the shelter. The nurse is responsible for gathering all patients' medical histories including demographics, medications, prior hospitalizations, surgical history, and any other pertinent medical needs before admission. The physicians assume responsibility for treating acute and chronic diseases and injuries, and for ordering necessary tests while the individuals are admitted to the shelter. Therefore, the public health providers seemed most appropriate, given their past experiences, to interview in order to gather data I could use to answer the research question.

I also assumed that collecting data from participants with disaster or emergency experiences would provide the best knowledge to ensure quality and credible responses in articulating their experiences. Further, I assumed public health providers, as opposed to other healthcare providers in other settings, could give valuable insight to understanding the use of EHRs in a disaster setting. Patton (2015) noted purposeful sampling enables the qualitative researcher to target the intended purpose and address the research problem.

Scope and Delimitations

The scope of this study entailed public health providers including physicians, nurse practitioners, and nurses in the state of Louisiana. The scope of the study was limited to public health providers in the state of Louisiana with an experience working in a disaster setting. Participants included public health providers who made critical decisions and provided medical care to displaced individuals in the aftermath of Hurricane Katrina without access to patient health information. Hurricane Katrina, one of the most disastrous storms, destroyed the medical infrastructure in both Louisiana and Mississippi (Arrieta et al., 2012).

The purpose of this study was to focus only on public health providers and to exclude volunteers and members of the United States Public Health Service. The participants were selected because of their experience and understanding of the phenomenon under study on the benefits or challenges of EHR systems in a disaster setting.

Limitations

One limitation of this study was the small sample. The data collected from such a small sample size did not include the perceptions of other public health providers outside of this study in various cities and states impacted by disasters. Therefore, there may be limits to generalizing the data to other settings and participants outside of those in this study (see Creswell, 2009).

A second limitation was the biased responses of participants based on the age of their experiences. The study participants' responses were limited and selective because of the time passed since the last disaster. The participants' perspectives may not reflect an accurate account of what occurred because of memories fading and people forgetting past experiences.

Another limitation was the research setting. My intent was to analyze the perceptions of public health providers regarding the use of EHRs in a disaster setting. Because the study did not take place in the disaster shelter setting, the interview setting over the telephone may have influenced their responses. Therefore, the phenomenological approach was suited in this study to gather data from the participant's point of view outside of the particular setting and actions.

In an effort to address the limitations of the study, I used triangulation and respondent validation, also known as member checking, as strategies to test for consistency across findings. Triangulation, a method of gathering data from multiple sources or using multiple methods, can assist in supporting the understanding of perspectives and enhancing consistency. Triangulation involves several approaches to

improve quality and credibility of data analysis to produce rich data (see Creswell, 2013; Patton, 2002).

In phenomenological studies, triangulation is essential in describing the participants' perceptions and clarifying findings, which emerges from interview transcripts, field notes, and other data collection methods. The use of triangulation in phenomenological studies can help to improve the researcher's evaluation of the findings by limiting bias interpretations because of the researcher's involvement in the study (see Golafshani, 2003).

Maxwell (2013) emphasized that respondent validation, as noted by others as member checking, is an effective strategy to avoid misconceptions and misunderstandings. The participants reviewed their interview transcripts as a measure to ensure quality, trustworthiness, and credibility. I used an interview guide to document information and maintain consistency when conducting the interviews. An audio recorder was also used to improve reliability in documenting the interview responses (see Creswell, 2013; Rolfe, 2006).

Summary

The healthcare system in the United States has gone through a major overhaul to improve the quality and safety of the healthcare delivery system (Bhansali & Gupta, 2014). Despite governmental initiatives to encourage adoption and implementation of EHR systems, healthcare providers and administrators debate the usefulness and benefits of EHRs. After reviewing the literature, I found a research gap regarding the usefulness

and effectiveness of EHRs (Audet et al., 2014; Cresswell & Sheikh, 2013; Kellermann & Jones, 2013; Menachemi & Collum, 2011; Wang & Biedermann, 2012).

There are barriers to implementing EHR systems such as decreased funding to sustain systems, technical challenges, user acceptance concerns, and organizational problems (Bhansali & Gupta, 2014; Hamid & Cline, 2013; Lakbala & Dinderloo, 2014). Although 78% of office-based providers had adopted some type of an EHR system by 2013, only 48% report they met the criteria for a basic system including patient history, clinical notes, problems lists, laboratory views, and radiology access (Hsaio & Hing, 2014).

The impact of disasters on healthcare infrastructures and communities brings new challenges to healthcare providers. During disasters, individuals with chronic illnesses face greater risks to experiencing poor health outcomes. To improve healthcare disaster response and to address healthcare needs, it is important to explore strategies for future disaster preparedness (Owens & Martsolf, 2014). As a result, the purpose of this study was to explore healthcare providers' perceptions of the usefulness of EHRs in a disaster setting.

I used the findings of this study to explore whether EHR use was beneficial in improving health outcomes in a disaster setting. Further, I used the findings to identify gaps and understand the perceptions of the healthcare providers for enhancing disaster response for communities as it relates to health outcomes. Chapter 2 includes a discussion of the literature review findings and past research on EHR use in various settings. Chapter 3 includes discussions of the study's design, data collection methods,

data analysis plan, and methodology. In Chapter 4, I detail the data collection and analysis. The details of Chapter 5 include my interpretation of the findings and discussion of implications for positive change.

Chapter 2: Literature Review

The purpose of this chapter is to provide an overview of previous research and review the current literature on the use of information technology in the healthcare setting and its proposed use in the disaster setting. The literature review included materials on the evolution of information technology in the healthcare setting, the adoption, implementation, the outcomes of EHRs, and how they relate to emergency preparedness in a disaster setting. I also discuss current theoretical models describing the adoption and utility of information technology practices for healthcare providers. This literature includes discussions of the intended use of EHRs and of both positive and negative behaviors associated with their adoption, utilization, and implementation.

Research Strategy

The use of EHRs is more prevalent in the inpatient healthcare setting, so researchers are just beginning to shift focus to outpatient settings such as disaster settings (Abir et al., 2012; Abramson et al., 2011; Horahan, Morchel, Raheem, & Stevens, 2014). As a result, I used the Walden University Library to search multiple databases including Proquest, EBSCO, Ovid, Academic Search Premier, ABI/INFORM, and SAGE. I also used Google Scholar to research relevant articles and conducted searching governmental websites including the Centers for Disease Control and Prevention, United States Department of Health and Human Services, and HealthIT.gov.

Keywords I used in these searches included the following: *disaster medicine, electronic medical records, electronic health records, disaster planning, health information technology, emergency medicine, mass casualty incident,* and *public health*.

For this review, I examined on texts published in English. The review included literature published between 2005 and 2015. Information technology has existed for years; however, the urgency and mandated requirements by federal policymakers to adopt it in the healthcare setting is relatively new, with even less implementation and adoption in the disaster setting. A summary of the literature review search is included in Table 1.

Table 1

Literature Review Summary

Category	Scholarly journals	Other reports	Books
Physician perceptions	10(6)		
Theory	24(4)		
Health information technology and disaster management	24(16)	10(5)	
Electronic health records and public health	9(5)	6(3)	
Interactive sociotechnical analysis/socio-technical systems	14(7)	2(1)	1(1)
Total	134(72)	32(15)	2(1)

Evolution of Information Technology

Although information technology has long been used in some healthcare settings, the emergence of new technology and its possible benefits to improving healthcare outcomes have led to more scholarly attention over the last few years. In 1996, the Health Information Portability and Accountability Act (HIPPA) highlighted the need for HIT related to patient safety and EHRs. Five years later, the Institute of Medicine's *Quality of Chasm* report indicated information technology (IT) as an important step in improving healthcare quality (Berkowitz, 2014).

Governmental efforts to improve the use of HIT advanced new federal standards and guidelines to support its use. Policymakers set a deadline that implementation would take place by 2014 (Bitton et al., 2012; Buntin et al., 2011; Hamid & Cline, 2013; Nambisan et al., 2013). The focus of the federal health IT vision and mission statement is on using IT to empower the population and improve health outcomes (ONC, 2011).

Governmental Funding Support of Electronic Health Records

In an effort to increase implementation, provisions in the American Recovery and Reinvestment Act (ARRA) included $787 billion to incentivize providers to adopt of EHRs (Buntin et al., 2011; Hamid & Cline, 2013). In 2009, members of Congress passed the Health Information Technology for Economic and Clinical Health (HITECH) Act, which President Obama signed into law. The HITECH Act delineated activities to increase adoption, implementation, and meaningful use elements. The provisions of the act encouraged a shift from traditional paper records to EHRs (Blumenthal & Tavenner, 2010; Hsiao, Hing, & Ashman, 2014; Maxson et al., 2010; Nambisan et al., 2013).

The mandates of the Affordable Care Act of 2010 expanded the efforts of the HITECH Act by stressing the significance of HIT. The regulations of the act identified the need to accomplish objectives focusing on healthcare quality and efficiency (Buntin et al., 2011). The impetus for transitioning healthcare systems to EHRs included improvement in providers' decision-making and patient outcomes (Blumenthal & Tavenner, 2010).

Affordable Care Act of 2010 Implementation Incentives

As part of the Affordable Care Act of 2010, the Centers for Medicare and Medicaid Innovation Center emphasized the importance of implementing an information technology infrastructure in healthcare organizations for better delivery of healthcare and cost reduction. The Medicare and Medicaid EHR Incentive Program include incentives and penalties related to EHR meaningful use federal requirements (Buntin et al., 2011). The meaningful use federal requirements extend beyond the adoption of EHRs and include other measures such as sharing data, securing the privacy of the data, involving patients in their health information, and improving health outcomes (ONC, 2011).

Medicare and Medicaid Electronic Health Records Incentive Program

The meaningful use requirements, organized into three stages, outline objectives necessary for incentive payments under the Medicare and Medicaid EHR Incentive Program. Eligible professionals, hospitals, and critical access hospitals meeting the technology requirements are eligible for payment. The goal is to promote improved patient care, quality, and safety through meaningful use of certified EHR technology (ONC, 2013).

Meaningful use stage requirements. Stage 1 program requirements outlined steps for eligible professionals and hospitals to meet 2011-2012 objectives. Components of Stage 1 requirements consisted of data capturing and sharing through a standardized format, utilization of information to monitor important clinical conditions, coordination of care, public health reporting, clinical quality measures reporting, and promoting patient and family participation.

Components of Stage 2 included advanced clinical processes in 2014 through health information exchange (HIE), patient-controlled data, electronic sharing of care summaries with other sites, and enhanced e-prescribing and integration of lab results. Stage 3 requirements for 2016 included improved outcomes demonstrated through patient access to their health information, enhanced population health, decision support for national high-priority conditions, and improved quality, safety, and efficiency (ONC, 2013).

IT is divided into three different organization types that include clinical information systems, administrative information systems, and decision support systems. Clinical information systems such as EHRs allow access to patient information, increase transparency, improve patient outcomes, enhance quality, reduce in costs, and facilitate coordination of health in healthcare systems (Audet et al., 2014; Fernandez-Aleman et al., 2013; Hamid & Cline, 2013; Johnson & Bergren, 2011; McAlearney, Hefner, Sieck, Rizer, & Huerta, 2013; Menachemi & Collum, 2011). EHRs enable the sharing of medical data between health providers and stakeholders, ultimately improving population health (Fernandez-Aleman et al., 2013; Friedman, Parrish, & Ross, 2013).

Health Information Exchange

HIE, the sharing of patient medical data, helps avoid duplication of treatment and over-medication, and aids in assessing real-time data to provide the most effective healthcare delivery. Decision support systems (DSS) or clinical decision support (CDS) systems enable the provider access to information such as patient allergy information, clinical guidelines, and drug interactions through alerts that trigger assistance in the patient's care. The intent of DSS and CDS support tools is to reduce clinical errors for improved patient care and treatment (Menachemi & Collum, 2011).

Computerize Physician Order Entry

Computerized physician order entry (CPOE) systems promote ordering of specific testing such as radiology and laboratory testing. CPOE systems are designed to minimize and avoid errors by providing clear, legible communication of orders through electronic entry versus the traditional paper method. The various tools may function as a separate system or operate as part of an EHR system (Menachemi & Collum, 2011).

Post-Adoption/Implementation of the HITECH Act

The use of EHRs can streamline processes and promote the integration of health services with one data collection point for multiple users (Friedman et al., 2013; Nambisan et al., 2013). The healthcare models, accountable care organizations, and patient-centered medical homes require HIE, interoperability, access to real-time care costs, and quality data to effectively manage population health and increase coordination of care. Information should be shareable across multiple settings such as nursing homes, rehabilitation facilities, and public health facilities. It is important to note that the

transition to and adoption of EHRs in other settings not covered under the HITECH Act has been slow (Bitton et al., 2012).

Jamoom, Patel, Furukawa, and King (2014) reported that at least 72% of physicians adopted an EHR system, while at least 40% adopted basic EHR components with advanced capabilities in 2012 following the implementation of the HITECH Act. In comparing the non-adopters to the adopters of EHR systems, financial barriers, productivity loss, training needs, and the lack of a system that meets the practice needs have been factors in EHR non-adoption (Jamoom, Patel, Furukawa, & King, 2014).

Health Information Exchange Between Facilities

According to Alder-Milstein and Jha (2014), hospitals are still facing challenges in enforcing information sharing. Their findings indicated that in spite of the 30% of hospitals that engage in HIE, there is a widespread variation across states. In addition to the difference between states, they found a difference between hospital types. The bivariate and multivariate analysis revealed more participation among nonprofit hospitals in comparison to for-profit hospitals (Alder-Milstein & Jha, 2014). The National Center for Health Statistics reported an estimated 18% increase (from 60% to 78%) between 2001-2013 in EHR system use by office-based physicians. As Alder-Milstein and Jha (2014) noted, in regard to HIE, there is a variation in EHR adoption among states (Hsiao & Hing, 2014).

In 2009, less than 20% of primary physicians had adopted either a partial or a full EHR system. By 2012, at least 72% of primary physicians' practices had implemented either a partial or a full EHR system (Audet, Squires, & Doty, 2014). The trend in

implementation of the EHR systems may have been a result of the government's initiatives to increase adoption; however, there is a need for further research to examine the effects of these external factors and the functionality and extent of HIT capabilities. In addition, additional studies are needed to examine the divide among providers (Audet et al., 2014).

Summary

In an effort to improve healthcare financial costs, patient safety, and patient outcomes policymakers implemented an initiative for innovative information technology. Healthcare providers, administrators, and policymakers have varying opinions regarding the potential benefits of information technology such as EHRs. In spite of the financial incentives, slow adoption and implementation of EHRs exist.

Adoption, Implementation, and Outcomes of Electronic Health Records

The HITECH Act supports the use of EHR systems in a meaningful way through provider adoption and implementation. The term "meaningful use" suggests utilizing EHRs to their full potential to decrease medical errors, contain costs, and ultimately improve outcomes and quality of care (Menachemi & Collum, 2011). Menachemi and Collum (2011) suggested important benefits of EHR systems that influence positive societal, clinical, and organizational outcomes.

EHR Practice Implications

Appari et al. (2013) conducted a study of acute care hospitals. The researchers, through panel data consisting of 2006-2010, analyzed modifications in EHR systems emphasizing 2011 meaningful use objectives and the effects on process quality. The

process quality variables included heart attacks, heart failure, pneumonia, and surgical care infection prevention. Although their findings did not demonstrate a significant improvement in process quality, their findings contributed to other studies displaying an association between HIT and process quality. Also, the researchers' findings suggested HIT modifications might not result in any quality improvements and one should consider the time needed to realize the improvements (Appari, Johnson, & Anthony, 2013).

In spite of the financial incentives to increase adoption and implementation of EHRs, slow adoption rates exist (Hamid & Cline, 2013; Nambisan et al., 2013). Nambisan et al. (2013) recognized that financial incentives are not the only reason for slow adoption. Fernandez-Aleman, Senor, Lozoya, and Toval (2013) and McAlearney, Hefner, Sieck, Rizer, and Huerta (2013) agreed that funding, attitude, organizational aspects, and technology as challenges to EHR implementation.

McAlearney et al. (2013) added to the body of knowledge that organizational issues may contribute to the failure of successful implementation. Similarly, Appari et al. (2013) pointed out that organizational and market factors make it difficult to measure the effects of EHR adoption and quality performance. *CDC's Information Technology Strategic Plan 2012-2016* suggested that environmental factors can either motivate or negatively influence implementation strategic plans for an organization. Environmental factors such as drivers, enablers, and trends, can dictate the direction of HIT strategic planning in organizations. This same principle can apply to the adoption and implementation of EHRs (CDC, n.d.).

Drivers consist of governmental laws and regulations that included the introduction of the Affordable Care Act of 2010, the HITECH Act, and the ARRA. Enablers, such as funding incentives and partnerships, provide the resources needed to support the challenges. Trends, such as the widespread use of EHRs and other technologies, influence enablers and drivers because it can guide the movement of activities (CDC, n.d.).

Rural Primary Care Office Setting

Singh, Lichter, Danzo, Taylor, and Rosenthal (2012) studied rural primary care offices and their level of information technology and EHR adoption at the national level. Rural offices face barriers associated with financial restraints and lack of expertise (Singh, et al., 2012) congruent with the same challenges as other healthcare facilities and primary care offices (Fernandez-Aleman et al., 2013; Hamid & Cline, 2013; McAlearney et al., 2013). In addition, the authors proposed linking organizational aspects, such as the size and organizational support to adoption, which may account for the slow adoption in rural primary care offices (Fernandez-Aleman et al., 2013; Hamid & Cline, 2013; McAlearney et al., 2013).

In Singh et al. (2012) findings, there was no difference between both offices in rural settings and urban settings in HIT and the overall use of EHR systems, although a difference was seen in organizational size and adoption. In fact, a number of rural offices without EHRs acknowledged possible benefits with the use of EHRs. The important fact remains in understanding the adoption patterns as policies and mandates change (Singh et al., 2012).

Long-Term Care Setting

In long-term care facilities (LTC), where the elderly population accounts for the majority of the patients, EHR adoption is at a much slower rate than other healthcare settings. Wang and Biedermann (2012) described the slow adoption rates because of financial aspects. At the same time, the promotion of the EHR adoption advances the acute and ambulatory settings (Wang & Biedermann, 2012).

Providers in the LTC settings face challenges with the utilization of EHR systems. There is a difference in the patient population in addition to a variation in the documentation of treatment and care when compared to acute care settings. LTC facilities offer a unique holistic approach to treatment that is different from the clinical setting (Wang & Biedermann, 2012).

Wang and Biedermann (2012) mailed surveys to 1,177 Texas LTC facilities with a response rate of 15 percent. Their study revealed a higher adoption rate in urban and suburban areas in comparison to rural areas. Of the facilities surveyed, at least 26 various software systems existed in the facilities that utilized EHR systems. The researchers noted higher utilization rates for administrative services versus clinical services (Wang & Biedermann, 2012).

According to Wang and Biedermann (2012), LTC facilities are complex and present unique challenges. Researchers have suggested the "one size fits all" concept does not work in every setting. The need to study EHR systems for clearer understanding, given the constant change of HIT and healthcare, remains crucial to

informing policymakers, researchers, and others regarding the adoption and implementation of EHR systems (Wang & Biedermann, 2012).

Acute Care Setting

Hamid and Cline (2013) conducted a study of physicians and advanced practice practitioners examining barriers and factors to adopt EHRs based on the provider type. In their findings, the researchers discussed the physician's opinion of the EHRs usefulness and provider autonomy as overall potential barriers to adoption for all provider types. They cited management support and provider involvement throughout the process as acceptance factors. Although advanced practice practitioners found EHRs easier to use, they were less motivated compared with other physicians to use it in their clinical practices (Hamid & Cline, 2013). Similarly, Kellermann and Jones (2013) suggested provider involvement as a significant factor in the development phase HIT systems.

Data from the 2009 and 2012 Commonwealth Fund International Health Policy Surveys of Primary Care Physicians revealed that 48% of physicians implemented some type of an EHR system in 2009 as compared to at least 72% in 2012. It is important to point out, the implementation of the HITECH Act and the introduction of the ACA occurred after the dissemination of the survey in 2009 (Audet, Squires, & Doty, 2014). According to Audet, Squires, and Doty (2014), it is unknown how external factors affected adoption and implementation practices. What these studies revealed were the variations in EHR systems (Audet et al., 2014; Hamid & Cline, 2013; Kellermann & Jones, 2013; O'Malley, Grossman, Cohen, Kemper, & Pham, 2010). Buntin et al. (2011)

stressed the importance of future studies to assess, document, and address the challenges to successful HIT adoption and implementation.

Public Health Setting

Walker and Diana (2016) highlighted the possible benefits to strengthening the public health infrastructure. In order to meet the meaningful use criteria, hospitals are required to report data electronically to immunization registries, laboratory results, and syndromic surveillance. The adoption and utilization of EHR systems within hospitals have implications for improving the public health's infrastructure and identifying potential barriers (Walker & Diana, 2016).

The research conducted by Walker and Diana (2016) attempted to analyze hospitals and their ability to share public health data. The authors identified the sample group as all non-federal acute care general hospitals in the United States who responded to both the 2012 American Hospital Association (AHA) Annual Survey and the 2013 AHA Information Technology supplement. Of the 2,841 facilities, less than 50% possessed the capability to share lab results, immunization data, and syndromic surveillance. While the study explored EHR adoption, it is important to note it did not account for utilization of the system (Walker & Diana, 2016).

Walker and Diana's (2016) found differences between rural and urban hospitals in comparison to physician office settings. Walker and Diana's (2016) study corresponded with Singh et al. (2012) implying the organization's size, such as hospitals and physicians' offices, played a role in EHR adoption. Both studies cited financial implications as challenges to adoption (Singh et al., 2012; Walker & Diana, 2016).

To build the public health's information technology infrastructure, public health will require the capability to receive data as well as exchange data. Based on the type of health department, local or state, the ability to accept data may vary across states (Walker & Diana, 2016). A small number of local public health departments have the ability to participate in HIE while the number of state public health departments contributing to HIE is unknown. HIE participation in public health departments varies across states (Walker & Diana, 2016) resembling the same factor related to HIE participation in hospitals (Alder-Milstein & Jha, 2014).

Public health departments utilize information technology systems to maintain, report, and capture data. Some of the challenges experienced by health departments encompassed an absence in the integration of health information systems and a lack of collaboration among other healthcare institutions and providers. The challenges that public health departments faced contributed to the development of public health systems in silos with limited ability to share information with external partners (Foldy, Grannis, Ross, & Smith, 2014; HHS, 2013). As the healthcare industry debated over the level of adoption and implementation of EHRs with the passage of the HITECH Act and the Affordable Care Act, the public health practitioners encountered similar challenges (United States Department of Health and Human Services [HHS], 2013).

The Assistant Secretary for Planning and Evaluation (ASPE) project evaluated the usage of HIT in both state and local government health departments and issued a report. Financial barriers and lack of informatics training were noted as some of the challenges to adoption and implementation (HHS, 2013) as supported by Hamid and Cline (2013)

and Nambisan et al. (2013) in their findings of physician offices. The ASPE report concluded a lack of best practices in HIT within public health (HHS, 2013).

A key component of the ACA promoted the strengthening of the nation's population health goals and preventing chronic disease (HHS, 2013). As mentioned in the ASPE report (HHS, 2013) and as discussed by Foldy, Grannis, Ross, and Smith (2014), the public health roles are unclear in addressing the ACA initiatives. It is important that public health stakeholders gain a clear understanding of how to incorporate the ACA objectives into the public health practice (HHS, 2013). The support of leadership, as suggested by Hamid and Cline (2013) in their study, can influence the progression of information systems and promote continuous quality improvements (HHS, 2013).

The public health practice presents challenges to incorporating information systems, as a result of its complex structure. Data exchange within the public health setting requires data sharing between numerous institutions. The various data sources needed for public health requires multiple information systems creating challenges for public health practitioners with frustration in the utilization of IT. The multiple information systems do not have the capability to share information with or receive information from other institutions. Consequently, the inoperable and multiple systems utilized for public health activities can lead to a delayed and an ineffective public health response (Vest, Issel, & Lee, 2014).

Vest, Issel, and Lee (2014) conducted interviews with public health practitioners; their findings indicated a need for improvement in information exchange. The public

health practitioners perceived an improvement information exchange would enhance public health practices and decision-making, therefore, enabling the safety and privacy of data. Local public health departments continue to depend on paper systems making it more of a challenge to share information electronically with state health departments and external organizations (Vest et al., 2014).

Organizational Outcomes

EHR systems generate a positive outcome for organizations. The organizations gain increased revenue, enhanced legal and regulatory compliance, and improved efficiency through avoided costs. Other benefits experienced because of EHR systems create the capacity to expand research efforts to improve society and increase job satisfaction. Physician job satisfaction can influence behaviors, physician practices, and quality of care. Although study findings yield positive benefits with EHR utilization, more research is needed to examine its benefits in other settings (Menachemi & Collum, 2011).

Quality of Care Outcomes

Menachemi and Collum (2011) examined the clinical outcomes of EHRs referencing three of the six components of the quality of care approach as outlined by the Institute of Medicine. The six components of quality include healthcare that is effective, safe, timely, patient-centered, efficient, and equitable. The researchers focused on patient safety, effectiveness, and efficiency proposing a need for more research in the areas of timeliness, patient-centeredness, and equitable access (Menachemi & Collum, 2011).

DSS or CDS tools demonstrated positive clinical outcomes in increasing vaccine administration rates for influenza and pneumococcal vaccines. The electronic alerts prompt providers to offer vaccines, contributing to successful adherence rates (Menachemi & Collum, 2011). Romano and Stafford (2011) argued a lack of evidence between improved quality and EHRs to support clinical decisions in ambulatory care. Their study's findings did not find an association with the use of CDS systems in ambulatory care visits (Romano & Stafford, 2011). Culley (2011) suggested a need to understand the usefulness of CDS tools in a mass casualty disaster response.

Outcome Evaluations

Despite the HITECH's support to improve adoption and implementation of HIT, difficulties remain in effectively evaluating its success. The technology infrastructure continues to emerge in understanding how HIT influences clinical and patient outcomes. Three challenges to evaluating HIT programs are the complex initiatives to adopt and implement HIT, contextual factors among various settings related to the program's impact, and understanding HIT innovations and the delivery outcomes (Jones, Swain, Patel, & Furukawa, 2014).

Privacy and Security

Threats to safety and privacy of the data may complicate decisions to adopt and implement EHR systems (Fernandez-Aleman et al., 2013; ONC, 2011). The Direct Project, instituted as part of the Nationwide Health Information Network, permits transmitting of encrypted health information data exchanged over the internet in a secure manner through transport standards. The project's standards cover only one dimension of

the complex level needed to achieve interoperability and interface among facility systems (Kellerman & Jones, 2013).

Societal Implications

Regarding societal implications, EHRs support healthy populations through preventative interventions (Menachemi & Collum, 2011). For example, in the literature review conducted by Menachemi and Collum (2011), electronic alerts advanced prophylactic treatment of patients at risk of deep vein thrombosis. Providers utilized anticoagulation therapy as preventative treatment resulting in a decrease in deep vein thrombosis and pulmonary embolism 90 days after hospital discharge (Menachemi & Collum, 2011).

Summary

EHR utilization varies among healthcare providers and healthcare organizations. Practice settings may influence the adoption and implementation of EHR systems. Because of the potential barriers to the adoption and implementation of EHR systems, it is important to assess how financial incentives, organization aspects, and perceptions play a role in acceptance factors. If the practice settings change, modification may be required to address the needs of the provider. EHR systems may have negative or positive implications for improving patient outcomes. Until evaluation methods are developed, it is not yet realized how patient outcomes are affected.

Theoretical Models in the Adoption of Information Technology

The emergence of information technology and the development of theoretical models spanning more than 30 years provide an explanation and understanding of the

complexities of user acceptance, adoption, implementation, and challenges of HIT within healthcare systems; however, a gap still exists. Theories such as the technology acceptance model (TAM), diffusion of innovations (DOI), theory of planned behavior, and socio-technical systems theory espouse similar concepts that support user acceptance between the individual and the system. Theoretical perspectives add to the existing body of knowledge about the determinants, design, and usage of information technology (Chutter, 2009; Dillon & Morris, 1996).

Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI)

TAM, a theory established by Fred Davis, recommended that factors such as perception and attitude in the ease of use and usefulness could predict the actual behavior to use the technology system. If a system is useful and convenient, this creates an attitude of acceptance. DOI, a theory established by Everett Rogers, proposed how new ideas can affect the spread of technology. The adoption of the new idea depends on the innovation factors (Putzer & Park, 2012).

In their study, Putzer and Park (2012) examined innovation characteristics that included observability, job relevance, personal experience, compatibility, internal factors, and external factors to study the use of mobile technology. These factors affected the providers' attitude in the use of the smartphone. They also found internal environmental factors such as support from management, organizational size, and ease of interoperability can influence adoption of evolving mobile technologies. The study supported previous studies that indicate factors such as compatibility, management support, and providers' personal experiences can affect their behavior to adopt

technologies (Fernandez-Aleman et al., 2013; Hamid & Cline, 2013; McAlearney et al., 2013).

A small number of healthcare institutions such as the University of Pittsburgh Medical Center and Stanford Hospital and Clinics transitioned their staff from pagers to smartphones (Putzer & Park, 2012). Putzer and Park (2012) suggested that smartphones might add influence in adopting HIT because of their convenience and proficiency. In their study, Putzer and Park (2012) examined healthcare providers' perceptions of smartphones in their daily clinical operations utilizing modified versions of the TAM and DOI theories.

Technology innovations emerged with the introduction of mobile devices. The term "mhealth" embraces the mobile technology growth with the anticipation to transform the future of healthcare. In addition to the smartphone, the use of tablet devices in healthcare adds a level of convenience and productivity when compared to the traditional desktop computer. Sclafini, Tirrell, and Franko (2013) surveyed 685 Accreditation Council Graduate Medical Education (ACGME) fellowship and residency training programs that included a total of 6,134 individual emails sent, the study revealed 40% of the respondents used a tablet. At least 50% of those surveyed utilized the tablets in the clinical setting for access to EHRs and point of care (Sclafini, Tirrell, & Franko, 2013).

Sclafini et al. (2013) findings indicated that physicians who purchased tablets did so without their organization's financial support. While physicians purchased their personal tablets and identified a need for mobile devices, they experienced slow

integration of the devices within the healthcare setting. A gap in the literature exists in exploring the use of tablets in the patient care setting and the utilization of theoretical frameworks in understanding the adoption and implementation of tablets (Sclafini et al., 2013).

Huryk (2010) compared the DOI theory to Kurt Lewin's change theory highlighting how individuals must perceive a problem and understand a need for change. The individual must realize that an innovation exists and understand its usefulness. Once the individual understands the benefits, then the reaction occurs through implementation, expansion, and generation of feedback for evaluation of the innovation. If healthcare providers see a need for HIT expansion and see that patient outcomes will improve, then the change is accepted (Huryk, 2010).

Huryk (2010) conducted a literature review examining articles related to registered nurses and their attitudes about technology. Nurses, who experienced the slow speed of the system, reported feelings of a poorly designed system and voiced a decrease in patient interaction, displayed negative attitudes towards implementation of the system. In the literature review, it was found most nurses demonstrated positive attitudes toward technology. In understanding the integration of both the DOI and change theory, the inclusion of nurses in the design of the EHR system and administration support of the change may yield positive attitudes (Huryk, 2010).

Theory of Planned Behavior

The theory of planned behavior, created by Icek Ajzen as an expansion of the theory of reasoned action, supports the connection between behavioral, normative, and

control beliefs as it relates to human action. Ajzen explains planned and deliberate behavior that guides attitude and intent to engage in a new behavior. The model is useful in explaining the healthcare worker's adoption of a computer system (Malo, Neveu, Archambault, Emond, & Gagnon, 2012).

Malo, Neveu, Archambault, Emond, and Gagnon (2012) conducted a study of nurses' adoption of computer systems working in the resuscitation unit of an emergency department utilizing the theory of planned behavior. Their study did not support the theory's perceived behavioral control belief found in the results of previous studies. The nurses' perceived behavioral control, normative beliefs, and attitudes did not influence their intent to adopt EHRs (Malo et al., 2012).

Actor Network Theory

The actor network theory, primarily developed by Michel Callon, Bruno Latour, and John Law describes human and inanimate objects such as computers within the social system as actors equally significant in gaining a better understanding the complexities of HIT. The theory conceptualizes the affect technology, specifically the EHR system, has on the social network such as the healthcare setting (Beasley, Holden, & Sullivan, 2011; Cresswell, Worth, & Sheikh, 2010). Although Cresswell, Worth, and Sheikh (2010) supported the ANT perspective, they identified the theory's limitations. Criticism of the theory stems from the approach to consider both human and inanimate objects as equal actors (Cresswell et al., 2010).

Cresswell and Sheikh (2013) conducted a literature review of 121 articles related to eHealth applications, at least, 13 articles proposed organizational issues as challenges

to adopting and implementing HIT. The researchers posited in addition to organizational issues, accounting for technical and social aspects is important to ensure it is beneficial, and it addressed the needs of providers and patients. The researchers attributed the difficulty in adoption and implementation of information technology to the complexity of the healthcare system (Cresswell & Sheikh, 2013).

The lack of theoretical-based research leads many to wonder about the development of possible solutions to improving organizational, social, and technical issues because of the gap in knowledge between the three dimensions (Cresswell & Sheikh, 2013). Cresswell and Sheikh (2013) stressed because of the lack of evidence, and it is difficult to generalize findings from past studies. They proposed the findings are very specific to the technology application and the organization absent of theoretical considerations. Their findings established a basis to study organizational strategies to develop best practice guidelines for future implementation and an avenue to guide future research (Cresswell & Sheikh, 2013).

Socio-Technical Systems Theory

Beasley, Holden, and Sullivan (2011) posited that in order to conduct effective research; the study should include the right conceptual framework and address the right problems. Socio-technical systems theory involves the social and technical systems. It acknowledges that healthcare providers, specifically physicians, require adoption strategies aimed at the physician community. This group tends to identify themselves as autonomous decisions makers whereas; communication strategies that utilize physicians as change agents may prove to work more efficiently. If physicians feel a sense of

distrust or a threat to their environment, they may resist engaging in adopting EHR systems (Nambisan et al., 2013).

Shaw et al. (2011) supported the socio-technical systems theory as a useful framework for their study because it addressed the communication and information aspects of healthcare emphasizing the relativity to promote healthcare delivery improvements. Their study explored how EMRs could benefit primary care physicians in chronic disease prevention, screening, and management. The theory enabled the researchers to explore the case study from a quality of care approach because of the influence of the social environment and the technology aspect (Shaw et al., 2011).

Socio-Technical Systems Theory and Clinical Decision Support System

Lindgren and Eriksson (2010) utilized the socio-technical systems theory to design and evaluate a clinical decision support system in dementia management. The researchers understood the relationship and collaboration between healthcare professionals and technology and the effect on health outcomes. They elaborated by highlighting how the elements of the theory provided a perspective of the work environment changes and cultural factors that could influence the system's use and vice versa. In other words, the advancement of the healthcare system should evolve from the work environment rather than an outside entity. Once the system emerges, then communication should occur to convey the expectations of usage and the system's benefits in patient outcomes (Lindgren & Eriksson, 2010).

Summary

Although technology models existed more than 30 years ago, the lack of a standardized model to evaluate HIT does not exist. The components of the theories discussed include how behaviors, beliefs, communication, and cultural aspects relate to user acceptance of information technology. However, more research is needed to interpret how behaviors, environmental factors, and technical factors influence the adoption and implementation of information technology.

Relevance to Emergency Preparedness in a Disaster Setting

The Centers for Disease Control and Prevention's (CDC) role includes the control and prevention of infectious diseases, chronic illnesses, injury prevention, and environmental threats that pose a risk to the health of Americans (Friedman et al., 2013). Public health's routine operations during normal operations are well defined; however, the public health's emergency preparedness roles are not so clearly understood. Public health agencies support communities to prepare, respond, and prepare for emergencies and disasters.

Common Ground Preparedness Framework

The Public Health Informatics Institute partnered with local and state health departments to develop the Common Ground Preparedness Framework (CGPF) (Gibson, Theadore, & Jellison, 2012). As part of incident planning and management, the CGPF identified the roles of public health. The framework encompassed six capabilities that included activities that address how to prepare, monitor, investigate, intervene, manage, and recover from an incident. One of the response activities included the public health

leaders' role to ensure the provision of mass medical care. If local resources, such as hospitals, become overwhelmed during an incident, public health agencies such as health departments will intervene to provide mass medical care (Gibson et al., 2012).

Another important concept within the CGPF framework emphasized the importance of communication and information management. The flow of information, information sharing, use of technology, and communication systems are integral to an effective response. Although the meaning of the framework details a broader sense of information management, understanding the use of information management, specifically EHRs, in a disaster setting is the aim of this study (Gibson et al., 2012).

EHR Benefits in the Public Health Setting

Friedman, Parrish, and Ross (2013) and Menachemi and Collum (2011) pointed out the positive use of EHRs in improving population health. In addition to the healthcare setting, interoperable technology systems can also improve public health benefits (Friedman et al., 2013). One of the core public health functions consisted of disease surveillance in an effort to control infectious diseases. State and local laws require mandated reporting to conduct surveillance and share information. Data sharing allows public health agencies to coordinate care, improve population health, and provide efficient resources to control disease (Gasner, Fuld, Drobnik, & Varma, 2014).

One of the five strategic goals as part of the Federal Health IT Strategic Plan is to improve population health (ONC, 2011). The use of EHRs can contribute to information sharing through the advancement of public health initiatives. The meaningful use

guidelines only require providers to report lab results, immunizations, and syndromic surveillance to public health authorities (Hoffman & Podgurski, 2014).

As a result of the ACA, changes to the delivery of preventative care services demand public health programs to shift their efforts and capabilities to integrate HIT and its utilization in health departments (Foldy et al., 2014). Foldy et al. (2014) expressed the need for health departments to focus future planning directed at increasing their capability to receive, manage, analyze, and secure personal health data beyond the traditional use. Hoffman and Podgurski (2014) discussed the need for public health research and further, the impact of EHRs relative to influencing public health decisions. While EHRs might provide legible medical information, observational data, disease surveillance data, and demographic data for public health research, the authors warn of EHR limitations, challenges, and the potential negative implications (Hoffman & Podgurski, 2014).

Despite the lack of interoperability between systems, there is also a need to improve the public health infrastructure and to earmark funds dedicated to enhancing public health technology (Hoffman & Podgurski, 2014; Lenert & Sundwall, 2012). According to Lenert and Sundwall (2012), the HITECH Act's initiatives provided funding for public HIT allocated through CDC, but the funds did not address data integration within their systems.

As a result, CDC's funding improved the overall public health infrastructure; however, allocation of funds to enhance the information technology infrastructure is needed (Hoffman & Podgurski, 2014; Lenert & Sundwall, 2012). Additionally, the

meaningful use requirements place a financial burden on local and state health departments. If an additional allocation of funds becomes available for improving public HIT, this increase may contribute to a better understanding of data analysis, public health outcomes, and effective utilization of EHRs in public health settings (Hoffman & Podgurski, 2014).

The ASPE report included three case studies of Northern Florida, Central Michigan, and Western Oregon. Of note, if states receive an allocation of funds, local and state health departments vary across states and programs promoting a different payment structure. Central Michigan and Western Oregon function under a decentralized state system not managed by the state or associated with the state's public health agency. Decentralized state systems contribute to limited resources, homegrown systems, and uncoordinated public health services and systems. Florida functions as a centralized state and public health agencies depend on the state's support. The funding challenges raise more questions and emphasize gaps in the development and management of integrated and interoperable systems (HHS, 2013).

Disaster Overview

Outside of a disaster, chronic conditions can limit daily functions and quality of life. Many Americans suffer daily from chronic conditions. During a disaster, the level of functioning, health, and quality of life may diminish as a result of impending or present danger. The disaster may present challenges that affect physical, social, and psychological factors beyond the normal impact. Public health actions, both during disasters and routine daily operations, can improve the community's response and general

health needs by enhancing the community's functioning capacity, quality of life, and productivity (Institute of Medicine, 2012).

Chronic diseases account for a large portion of deaths in the United States. Over 50% of Americans possess at least one chronic condition. Health disparities exist among ethnic/racial groups, social determinants of health, geographic settings, and other groups. HIT may be resourceful in decreasing costs and improving outcomes related to chronic diseases (Moore et al., 2014).

When individuals evacuate from a disaster-impacted area, they will escape the danger often leaving behind any documentation of their medications or treatment information. One of the challenges individuals may face can lead to the loss or destruction of their paper medical records aggravated by a disaster. Hurricane Katrina resulted in the destruction of over one million paper records while other disasters required medical workers to depend on the patients, families, and friends (Wolter, Dolan, & Dooling, 2012).

Disasters and Health Information Access

Wolter, Dolan, and Dooling (2012) stressed the importance of information exchange during a disaster to strengthen emergency response. The authors suggested the development of patient health records because of the potential widespread damage to healthcare facilities. Patient health records require the individual to take charge of their health through managing their health information or through a download from the patient's provider EHR system (Wolter et al., 2012).

As part of EHR systems, patient portals may provide access to health information during a disaster. Patient portals allow physicians the ability to share information with patients electronically from a remote location. Patient portals fulfill the meaningful use requirement to receive the EHR Incentive Program and it may influence providers to implement the system. The patient portals can provide information such as demographics, allergies, medications, an interaction between the provider and the patient, and medical history (Wolter et al., 2012).

For instance, Moore et al. (2014) studied mobile health infrastructure and its practical use in an urban setting. The study examined underserved adults with diabetes and their disease management through text messaging. Text messages were sent to patients to obtain their blood glucose levels and blood pressure readings provided outreach communication, and other pertinent information such as medication refills. The soft platform system transferred data received from the patients into the EHR system within the Denver Health's system (Moore et al., 2014).

The study's findings demonstrated the mobile health infrastructure as feasible and a valid mechanism for disease management of the underserved population. Participants in the study reported improved awareness and self-management with text messaging. Although the study supported the use of text messaging as a positive tool for communication and disease management, the study's findings did not determine any impacts to clinical outcomes (Moore et al., 2014).

Disasters can overwhelm existing healthcare facilities. A knowledge gap exists in the scientifically, grounded understanding of information and technology needs of the

healthcare workers during decision-making in an emergency response. Furthermore, a lack of standardized definitions and common factors exist that influence the effective management of mass casualties. This fact highlights a need for a scientific inquiry into studying mass casualty response (Culley, 2011).

Culley (2011) emphasized the lack of a standardized theoretical framework to measure the effectiveness of information decision support systems. Hoffman and Podgurski (2014) suggested the use of EHRs may prove beneficial during a public health emergency. EHR systems during a disaster, whether in a field or disaster setting, can facilitate access to health information when damage occurs to healthcare facilities (Hoffman & Podgurski, 2014). Although large healthcare institutions such as the Veterans Administration and Kaiser Permanente receive praise for successful HIT usage, both systems lacked interoperability to share health information outside of the network (Kellermann & Jones, 2013).

When a disaster occurs, local volunteers, healthcare workers, and deployments teams aid in the response. Disasters may strike causing short-term or long-term recovery burdening the local healthcare infrastructure for coordination of healthcare response activities. An effective disaster response demands preexisting baseline health data (Aung & Whittaker, 2013). Aung and Whittaker (2013) suggested an emphasis primarily placed on the deficiencies of response agencies to informational needs with a limited focus on the essential needs of health information systems in disaster planning.

The various types of information needed throughout a response depend on the type of disaster, the socioeconomic status of the impacted area, the individual

communities and their health status, the infrastructure, and the information systems. The informational needs of a disaster may comprise the sanitation structure, level of resource capability, and identification of health needs to allocate resources effectively. The access to such needs could potentially mitigate further morbidity and mortality in the affected area (Aung & Whittaker, 2013).

Routine Health Information Systems (RHIS)

Aung and Whittaker (2013) analyzed the Routine Health Information Systems (RHIS) utilized in developing countries. RHIS collected resource health data resources, interventions, and population health status to measure routine data quality. The system used gathered detailed information regarding the health needs of a population for the development of interventions and decision-making (Aung & Whittaker, 2013).

Hotchkiss, Aqil, Lippeveld, and Mukooyo (2010) and Aung and Whittaker (2013) challenged the performance of RHIS. RHIS contributed to ineffective data collection, analysis, and data utilization within the healthcare system (Aung & Whittaker, 2013; Hotchkiss et al., 2010). Due to the deficiencies and issues encountered with RHIS during routine operations of information support, the authors supported an improved framework designed to address informational health needs for disaster response (Aung & Whittaker, 2013). Aung and Whittaker reinforced the use of RHIS during a disaster with the aim to strengthen its capability for an effective health response.

Performance of Routine Information System Management (PRISM)

The components of the Performance of Routine Information System Management (PRISM) facilitated an understanding of health information systems and measuring the

impact of RHIS as it relates to performance and health outcomes. The framework incorporated three elements of performance outcomes that included organizational, behavioral, and technical components. Ultimately, identification of the three elements may assist in the adopting of the RHIS in developing countries. The improved performance and desired outcome require the right amount of staff, knowledgeable individuals, resources, data quality, and the organizational structure to work effectively (Aung & Whittaker, 2013; Hotchkiss et al., 2010). Before the realization of benefits regarding the PRISM conceptual framework in improving RHIS comes to light, more research is needed (Hotchkiss et al., 2010).

Disaster Response and EHR Systems

Abir, Mostashari, Atwal, and Lurie (2012) proposed the adoption of EHR systems could influence its use in emergency preparedness. The authors suggested benefits to utilizing EHR systems during disasters. After the devastation induced by Hurricane Katrina, flooding waters damaged medical records and numerous individuals left their homes without medications. Physicians outside of the impacted area provided treatment to individuals with multiple chronic conditions and in the absence of medical records (Abir, Mostashari, Atwal, & Lurie, 2012).

Although Joplin's healthcare facility suffered damage caused by the tornado, the newly implemented EHR system within the facility improved the continuity of care. The receiving healthcare facility assessed medical records of transported patients through the EHR system. Physician clinical practices with inoperable facilities continued to provide

medical support through the EHR system from other alternative locations (Abir et al., 2012).

Chan et al. (2011) conducted a quantitative study using a mass-casualty simulation exercise. Real-time information may assist with determining needs; however, there are challenges to capturing real-time data to improve information technology capabilities in disaster settings. Chan et al. and Culley (2011) agreed to the difficulties in conducting controlled experimental research in a disaster setting. Their findings showed documentation utilizing the wireless electronic medical record system was more effective than the traditional paper method (Chan et al., 2011).

Despite the improved tracking and documentation experienced with EHR in the simulation exercise, challenges exist. Technical challenges include robust and reliable systems needed to operate in a damaged infrastructure. Also, slow adoption of systems, the need to integrate the EHR system into the workflow, limited evidence of the system, and the associated cost attributes to some of the challenges (Chan et al., 2011). Chan et al. (2011) suggested more research studies and large-scale exercises to build the infrastructure, acceptance, and workflow needed for the use of advanced technology in disaster and emergency medical responses.

National Planning Frameworks

The National Planning Frameworks include five components of disaster preparedness. The five preparedness components for communities are prevention, protection, mitigation, response, and recovery (Horahan et al., 2014). Horahan, Morchel, Raheem, and Stevens (2014) explained the concept of preparedness as a strategy

involving communities to integrate their routine operations into disaster responses. EHRs fit this recommendation because of the link to routine operations for use in a disaster response. As suggested by Horahan et al., access to EHR systems during a disaster improves medical management, redundancy, and decreases healthcare costs.

In 2012, Hurricane Sandy damaged Long Beach Medical Center's infrastructure in New York. The building was not operational for patient services. New York concentrated their efforts in building their HIE within the state. During the storm, the use of EHRs proved beneficial in spite of the damage sustained by the hospital's infrastructure in comparison to destroyed paper records in other facilities (Horahan et al., 2014).

In 2010, an earthquake immobilized Haiti and the entire medical infrastructure. In addition to the significant number of deaths, at least 300,000 individuals experienced injuries and temporary shelters housed more than 1 million people. Medical volunteers responded providing health services to all of the displaced population. The numerous response volunteers and the destruction of the healthcare facilities created an austere environment (Callaway et al., 2012).

The catastrophic event damaged the health infrastructure warranting the provision of healthcare in a large field hospital in Haiti (Callaway et al., 2012). Callaway et al. (2012) studied the deployment and development of a new EHR system, mHealth technology system. Before the implementation of the system, individuals missed scheduled surgeries, documentation of surgeries did not occur, and continuity of care failed because of the limited communication. The study hoped to highlight the benefits

of an information technology system in providing an operational framework to manage the earthquake's aftermath (Callaway et al., 2012).

A research team surveyed providers within the field hospital to identify gaps experienced while providing care in the disaster setting and to select the best mobile system. An off the shelf system was selected based on its capability to function with and without internet services. The mobile system was designed to address patient tracking issues, real-time data, resource management, and to improve patient outcomes based on the feedback from the providers (Callaway et al., 2012).

The findings of the study conducted by Sclafini et al. (2013) supported the findings of Callaway et al. (2012) whereas healthcare providers see a need for mobile health systems. In addition, engaging physicians in EHR systems, assessing their perceptions, and recognizing barriers can help to improve disaster response (Buntin et al., 2011; Callaway, 2012). The same challenges such as cost-effectiveness programs and the lack of training resources as in other healthcare settings exist in the disaster setting (Callaway et al., 2012; Hamid & Cline, 2013; HHS, 2013; Jamoom et al., 2014; Nambisan et al., 2013).

The mobile health system provided continuity of care among transitioning providers, a useful tool for patient triage, and assistance with tracking patients throughout the field hospital (Callaway et al., 2012). Callaway et al. (2012) discussed the lack of a mobile technology platform specifically designed for disaster response that incorporated cost factors and addresses the barriers identified by providers within the field setting.

The authors emphasized the need for future studies to concentrate on patient outcomes encompassing safety, morbidity, and mortality (Callaway et al., 2012).

In spite of the possible benefits utilizing mobile health technology in the disaster setting, threats to data safety and management are up for discussion. One solution to maintaining data safety is to implement a tiered access system (Callaway et al., 2012). Callaway et al. (2012) agreed the benefits of the mobile health system are significant regardless of the evident challenges.

Bookman and Zane (2013) evaluated the response of a real time mass-casualty event within a hospital setting related to utilization of electronic radiology ordering. Although Menachemi & Collum (2011) supported positive outcomes with the use of CPOE in hospital settings, Bookman and Zane's findings suggested the current electronic ordering systems within hospitals present challenges during a patient surge. In preparation for emergencies and responding to disasters, safe and efficient healthcare delivery remains important. It is imperative that innovative solutions and future research studies target preparation needs for surge capacity and how it relates to EHR utilization (Bookman & Zane, 2013).

In 2011, Shinchi-town, Japan endured an earthquake, tsunami, and a nuclear disaster. After the radiation disaster, disaster medical teams in six shelters delivered services to at least 1,000 individuals in the impacted areas. Of those housed at the shelter, a portion of the elderly population suffered from chronic conditions while others needed acute care requiring medical support. The response workers administered care

within the shelter and operated a temporary emergency clinic to provide the needed support on a daily basis (Nagata, Halamka, Kennochi, Himeno, & Hashizume, 2013).

The disaster medical teams struggled with communication among team members, duplication of records, continuity of care, and issues with information sharing in a rapidly changing environment. The response teams depended on paper records, which delayed data collection and retrieval. Information sharing was difficult between shelters and the temporary emergency clinics, which led to the duplication of records, repetitive questions asked to patients, information obtained from patients, and ineffective follow-up as they moved throughout the shelters (Nagata et al., 2013).

The hospitals in Japan utilized the closed system for their EHR systems; however, during the disaster recovery, the development of the cloud-based system performed better in the shelters. The study's findings supported an EHR system utilizing a cloud-based system versus a closed system. The researchers proposed the entry of individuals' demographics before a disaster occurs, integration of systems across hospitals to allow for data sharing, and a revision of safety regulations for future preparedness and long-term planning (Nagata et al., 2013).

Summary

Despite legislation and the financial incentives given to healthcare providers and healthcare organization administrators, the adoption of EHR systems are either slow or the implementation process does not satisfy the meaningful use criteria. The use of information technology demonstrated maximum performance in other industries, but its success in the healthcare setting is up for debate. An evaluation of the literature indicates

the lack of research studies available to examine HIT and its impact on the delivery of healthcare and to evaluate quality improvement within the system. Even fewer studies exist in HIT and its use in the disaster setting.

In reviewing the literature, there are discrepancies among healthcare providers across clinical practice settings regarding the benefits and adverse outcomes with EHR uses (Audet et al., 2014; Buntin et al., 2011; Singh et al., 2012; Wang & Biedermann, 2012). Previous researchers discussed a lack of theoretical frameworks to study the benefits of EHR systems. Most of the available studies did not include a framework. In addition, the development of policies that address privacy and safety issues should be considered for future research (Aleman, Senor, Lozoya, & Toval, 2013).

The review of the literature revealed some of the major issues in the adoption and implementation of EHR systems in daily operations (Fernandez-Aleman et al., 2013; Hamid & Cline, 2013; McAlearney et al., 2013; Nambisan et al., 2013). Singh et al. (2012) and Noblin et al. (2013) suggested that some studies yielded mixed results related to the benefits and negative effects of EHR systems warranting more knowledge in the field. The adoption and implementation of EHR systems provide major implications in the nation's healthcare preparedness efforts (Abir et al., 2012). Buntin et al. (2011) and Nambisan et al. (2013) emphasized the need for more studies that document challenges and barriers to implementing HIT and solutions for solving the issues.

A need exists for researchers to analyze how communication and sociocultural factors influence adoption and implementation of EHR systems. More studies are needed to explore non-economic and individual level factors versus economic factors for the

successful adoption of EHR systems. The financial incentives did not positively influence all healthcare providers to adopt EHR systems and even some healthcare providers initially adopted the process but did not complete the full implementation of the system for the meaningful use criteria (Nambisan et al., 2013).

The healthcare environment involves complex challenges in its daily operations and the threat of disasters that maximizes new challenges. In a disaster setting, improvements in existing systems may be needed for healthcare providers to deliver safe and effective care (Bookman & Zane, 2013). In other practice settings, modifications of the workflow within the setting and the need to individualize commercial products to fit the needs of the individual may address the challenges in a disaster setting (Bookman & Zane, 2013; Nambisan et al., 2013). Therefore, more research is needed to evaluate the needs of the providers during disasters and to improve healthcare outcomes.

The review of the literature helped to identify the current electronic applications that are in place such as patient tracking information and demographics in a disaster setting may provide some assistance. While these systems may play an important role, the literature does not examine whether access to health information and information sharing may prove beneficial in coordinating care during a disaster. In addition, a gap in the literature exists because of the inability and difficulty to conduct experimental studies during a real-time disaster event (Chan et al., 2011; Culley, 2011).

Engaging healthcare providers, an evaluation of their perceptions, and identification of barriers to utilizing EHRs in a disaster setting can assist in streamlining future processes and increasing the capabilities and functionalities of EHR systems in a

disaster response. The gap in the literature demonstrates the need for more additional studies that evaluate and document the challenges. The emerging information technology needs of healthcare suggest a need for more researchers to demonstrate evidence in the advancement, utilization, and benefits (Buntin et al., 2011). The gap in the research serves as the core of conducting this research to examine providers' perceptions of the use of EHRs in the disaster setting.

Chapter 3 details the methodology used in this study. Also, included in this chapter are the research design and the data collection plan. A further explanation of the data analysis plan is included in the study and the findings are discussed in this chapter.

Chapter 3: Research Method

Methodology

The purpose of this study was to explore the perceptions of public health providers and to understand the influence of EHRs in a disaster setting. The public health providers in this study had worked in a disaster setting. The phenomenological approach enabled me to study individuals and to examine the deeper meaning of their experiences, perceptions, and feelings about the phenomenon. In this chapter, I describe the study's methodology and further explain my reason for using qualitative research. The chapter also includes discussions of the research design, rationale for use, and the relevance of the research questions in this study.

Research Design and Rationale

Phenomenological research enables the researcher to find meaning in the perspectives and experiences of others. The approach requires a small number of participants to reach their core perceptions and to identify issues without inserting assumptions. I selected this method because it enabled interaction between the participants and me, which I could use to understand how the experiences integrated with the environment. Instead of making assumptions about the research questions, I engaged the participants as part of the study (see Reiners, 2012).

Phenomenology has two main philosophical trajectories, descriptive and interpretative. Edmund Husserl, recognized as the founder of descriptive phenomenology, focused on setting aside opinions to describe the experiences of the individual. Martin Heidegger advanced interpretative phenomenology by highlighting

the importance of capturing the individual's experience incongruence with the interpretation of psychological or sociological factors (Reiners, 2012).

I used the qualitative approach utilizing interpretative phenomenology to explore participant perceptions. While various approaches such as grounded theory, ethnography, case study, and narrative study could have led to usable data, I determined that the phenomenological design was the most appropriate mode of inquiry for this study. The phenomenological approach allowed me the opportunity to study the meaning and the structure of the lived experiences as reported by the participants (see Creswell, 2013; Patton, 2002).

In this study, I took a hermeneutic approach (Lopez & Willis, 2004). Interpretative phenomenology incorporates hermeneutics as a means of understanding and adjusting preconceived perspectives through interpretation of participants' experience and behaviors (Moustakas, 1994). In this approach, the researcher can inquire about the participant's lived experiences that relate to imposed social, cultural, and political factors. In essence, both the participants and the researcher's perspectives are integrated in the study, a phenomenon Heidegger named *co-constitutionality* (see Lopez &Willis, 2004).

The following primary research question guided this study: What are the lived experiences of public health providers in Louisiana regarding the meaningful use of electronic health records in a disaster setting?

I also developed three subquestions:

1. What are reasons, if any, that public health providers perceive the use of EHRs as useful?
2. What do public health providers perceive as barriers to providing healthcare during emergencies and disasters?
3. What positive and negative experiences, if any, have public health providers encountered that may affect their clinical decisions in providing patient care in the absence of electronic health records?

Role of the Researcher

In my role as research instrument, I focused on the participants' perspectives (see Reiners, 2012). According to Husserl, one approach to phenomenological studies is to suspend all preconceived thoughts, known as epoche (Husserl, as cited in Creswell, 2013). In such instances, researchers can bracket themselves from the study to concentrate on the participants' experiences in the study. Moreover, as suggested by Giorgi, researchers do not have to overlook their personal experiences as long as they do not influence the meaning of the participants' experiences (Giorgi, as cited in Creswell, 2013).

Integration of the roles of the researcher and participants is an important component in qualitative research. The researcher uses his or her ears and eyes to collect information as part of the qualitative study (Janesick, 2011; Maxwell, 2013; Reiners, 2012). In the study, I identified my own preconceptions to better understand the participant's points of view (see Maxwell, 2013). The use of my experiences and prior knowledge were valuable in understanding and interpreting the data (see Lopez & Willis,

2004; Reiners, 2012). Although my previous experience involved working with most of the healthcare providers as a public health nurse during past employment, I did not hold a position of authority with any of the participants.

Qualitative research enables the researcher to be flexible and to integrate his or her beliefs in understanding the participants' experiences and insights (Maxwell, 2013). I used a research journal to document reactions and reflections in order to bracket personal feelings. Reflexivity helps the researcher identify any biases. In phenomenological research, the researcher can get to the deeper meaning by understanding his or her feelings and biases (Creswell, 2013).

Participant Selection

Polkinghorne (1989) suggest that a sample size of 5 to 25 participants is sufficient to gather rich descriptions of a given phenomenon. Researchers categorize their sample sizes differently based on the type of study. Qualitative research favors a small sample size (Miles & Huberman, 1994). With larger sample sizes, the researcher may struggle with recognizing emerging data because of the complexities that exist in larger populations (Patton, 2002).

According to Patton (2015), selection of the sample size varies based on the study design and available resources. A larger sample size may provide more breadth in a study; however, smaller samples are better suited for researchers who seek depth. Sample sizes may start out small or large, and depending on the level of saturation, the sample size may require modification by the researcher (Patton, 2015). Creswell (2013) and Polkinghorne (1989) noted that selecting participants who make up a homogeneous

group may lead to a quicker point of saturation to achieve thick, rich data. The participants consisted of public health providers who made up the homogeneous group in this study.

Criterion sampling, a purposeful sampling approach, permits the researcher to examine significant characteristics by linking the research questions to the criteria (Miles & Huberman, 1994). The use of criterion sampling can assist researchers in developing criteria to produce rich data. Criterion sampling requires the researcher to identify essential characteristics as inclusion factors to gain information relevant to the study's purpose (Creswell, 2013; Patton, 2002).

To be included in this study, participants must have been nurses or doctors who worked as providers at an emergency medical shelter in Louisiana during a previous evacuation of Louisiana residents. The participant was required to have experience working in a shelter setting and to have provided direct medical care and/or treatment to patients. The population for this study included one physician, one nurse practitioner, and five nurses who worked in a disaster setting in Louisiana. The individuals selected were experienced in the field of public health and disaster work, and were willing to discuss their perceptions of the usefulness of an EHR system. Communities in Louisiana have unfortunately experienced several disasters over the years. I targeted public health professionals in the geographic locations where the medical shelters are normally opened.

Contact information for the nurses was obtained from the Louisiana State Board of Nursing, and information for the physicians through the Louisiana State Board of Medical Examiners. I initially proposed a sample size of 10, however, only 7 participants

volunteered for the study. I thus used snowball sampling to increase recruitment in the targeted population. Through criterion sampling and snowball sampling, I identified several public health professionals within the state who met the criteria. Participants were selected from the northern and central portion of the state, including Shreveport/Bossier City, Alexandria, and Monroe, where the medical special needs shelters are normally set up to accept evacuating citizens from the southern part of the state.

Walden University's Institutional Review Board approved the study (#08-16-16-0353881). The study participants included public health physicians and nurses who worked in the state of Louisiana during a disaster event. I initially contacted individuals through the United States Postal Service with a participant recruitment letter (Appendix A) and a screening questionnaire (Appendix B). The recruitment letter outlined the purpose of the study, confidentiality information, participant's rights, and contact information. A screening questionnaire was included to ensure the individuals met the study's criteria. I emailed participants a consent form after the participant agreed to be a part of the study.

Instrumentation

The data collection method for this study included in-depth interviews, a review of journal notes, and observations (Creswell, 2013). The interviews consisted of one-on-one interviews with open-ended questions related to the research questions. I used an interview protocol to guide the questions in hopes of revealing real-world experiences.

Triangulation employs data from numerous sources to enhance the validity of the study (Creswell, 2009; Creswell, 2013; Maxwell, 2013). Data collection methods have various strengths and weaknesses that can limit what the researcher hopes to gain from the participants with only one data collection method. Creswell (2013) and Maxwell (2013) emphasized the importance of multiple data collection methods to encourage rich data. The use of multiple data collection methods limits the threats associated with biases of a particular collection method (Maxwell, 2013). I utilized data collected from interviews, observation notes, and field notes throughout the study.

Qualitative interviewing is useful when events that occurred in the past are used to assess behaviors. It helps the researcher understand behaviors and perspectives by prompting the participant's thoughts. Interviewing relies on the participant sharing of previous experiences in addition to observations made by the researcher (Maxwell, 2013). The interview questions were developed through a review of the literature to get a better understanding of the problem. The ITSA framework was used to develop the research questions.

I collected data by using semi-structured interviews from selected participants allowing the participants to express their thoughts and feelings. Prior studies that focused on perceptions of providers related to EHRs asked open-ended questions to evoke responses (Bouamrane & Mair, 2013). The interview questions consisted of fourteen open-ended questions to elicit detailed responses (see Appendix D).

Observation can assist the researcher to document useful information in the field. Participant observation provides a different approach to conducting fieldwork. The

researcher may miss out on body language and behaviors if relying only on interview information. The role of observation in this study is to describe the setting and the participants' behaviors during the interview (see Maxwell, 2013).

The purpose of using observation in the interviews is to look for any patterns of behavior and relationships (Creswell, 2013). Although the interviews took place over the phone, observations in this sense included listening to nonverbal clues and communication of the participants during the interviews to gain a general overview. The interpersonal interactions with the participants helped to capture their behaviors and the interactions with administrative staff during the approval process gave insight to the agency's challenges with recent implementation of EHRs in the clinical setting (see Patton, 2015). The physical environment can impact the success or failure of the discussion. Although the interviews took place over the phone, field notes were used to document observations and my feelings (see Patton, 2015).

Data Collection

Individuals received a participant recruitment letter (Appendix A) and a screening questionnaire (Appendix B) through the mail to make initial contact. The recruitment letter provided the purpose of the study, confidentiality information, participant's rights, and contact information. A screening questionnaire was included to ensure the individuals selected met the study's criteria. The consent form was emailed after the participant agreed to be a part of the study.

After I received and reviewed the screening questionnaire, a consent form was emailed to the potential participant. The consent form was sent within three days of

receiving the screening questionnaire or if any initial contact from the potential participant was received that met the selected criteria. I emailed the consent form and asked the participant to choose a face-to-face or telephone meeting to conduct the interviews. After receiving an initial contact from the potential participants, a follow up email was sent within two weeks as a reminder and a second email was sent within three weeks. All participants consented to participate in the study.

After the participants' consent, an audio recorder was used in the face-to-face interviews for an accurate account of the interview. After the interviews, the observational data was transferred from the journal notes to the observation protocol (see Appendix D) with descriptive notes and reflective notes from the interview. Although a formulated protocol was used to guide the interview process, I remained flexible throughout the interviews to allow emerging themes that came up during the interview to understand the entire context (see Miles & Huberman, 1994).

Journal notes were collected throughout and after the interview. The use of journal notes allowed for documentation of my experiences, assumptions, and concerns through the process. I utilized my journal notes as a means to document my reflections and to gain insight into future questions. For example, my experience working as a nurse in a medical shelter, and the research study was an opportunity for me to express my thoughts and experiences in my research journal (see Ortlipp, 2008). Ortlipp (2008) suggested written reflections can influence how to collect, analyze, and interpret the data.

Initially, document analysis was proposed as another source of data collection. Approval was not received from the research site to utilize past evaluations collected

from public health providers after the past disaster events. Therefore, document analysis was not used as a data collection method.

Observation, journal notes, and semi-structured, open-ended interviews were used to collect data to understand and capture the full meaning of public health providers' perceptions the usefulness of EHRs in a disaster setting (see Moustakas, 1994). The data collection methods occurred simultaneously throughout the research process. The data was collected and analyzed concurrently to better determine the point of saturation (see Bowen, 2009; Maxwell, 2013). The purpose of the study and the quality of data obtained through data collection and analysis determined if the sample size required adjustments (see Patton, 2015). In spite of the low number of participants, the research questions were answered through acknowledgment of data redundancy, comparisons, and identifying patterns of appropriate samples (see Bowen, 2009).

Interview Protocol Testing

Although pilot testing is not commonly used in qualitative studies, its use is beneficial (see Chenail, 2011). Pilot testing allows researchers to test data collection methods and clarify any challenges before the study is conducted. It is especially helpful for new researchers to practice interviewing skills and observation techniques (see Chenail, 2011; Dikko, 2016). Open-ended questions can be difficult to develop that ensure the right questions are asked to gain the appropriate responses. Pilot testing in qualitative research can assist with improving credibility, instrument rigor, and trustworthiness (Chenail, 2011).

IRB approval was received to test the interview protocol. The purpose of the pilot testing was to test the interview protocol to ensure the questions would generate information necessary to answer the research questions. The participants in the pilot testing were selected based on convenience and relativity to being a public health employee or a professional that has worked with EHRs (see Creswell, 2013).

Three individuals were involved in testing the interview protocol. The interviews consisted of a face-to-face interview and two telephone interviews. Two of the participants were healthcare professionals, a physician and a retired public health nurse, and the other participant was a program manager who worked in the field of disaster management for a least 10 years. The participants were given informed consents to participate in the study and agreed to audiotaping of the interview.

Each participant was asked to give verbal feedback. After receiving feedback from the participants, it was noted the questions were understandable, appropriate, and flowed in the sequence asked. Although no modifications were made to the interview guide, it was suggested that two questions may require further clarification. The testing allowed me to gain insight on how the interview process would flow and how long the interviews would last.

Data Analysis Plan

Data analysis enables the researcher to expand the data collected from the study and to discover new information from findings (Patton, 2014). Maxwell (2013) advised the data analysis process should occur throughout data collection to avoid waiting to the

end of research. As a result, data analysis occurred concurrently with data collection to provide insight of the data early in the process (see Creswell, 2009; Maxwell, 2013).

The hermeneutic circle method of analysis influenced the data analysis approach. The hermeneutic circle of method analysis approach allows the researcher to analyze the data through a reoccurring process of evaluating the wholes and parts of the collected data. It is a circular process used to get to the meaning of the text integrated with the researcher's understanding of the text without bracketing one's opinions or experiences (Patton, 2015; Reiners, 2012).

Heidegger supported the use of the hermeneutic circle of analysis to account for the researcher's experience and shared knowledge and involvement in the analysis process (Reiners, 2012). Although Heidegger points out the difficulties with the researcher bracketing their preconceived ideas and preunderstandings, it is important that the researcher makes their preconceived ideas and thoughts known to the reader. The researcher reduces the chance of imposing their ideas and understandings in interpreting the data (Parsons, 2010).

After the completion of each interview, I listened to the audiotapes, reviewed the observation notes, and journal notes to evaluate for any modifications needed. After reviewing and analyzing the interview transcripts, an emailed copy of the transcript was sent to the participant for review and to correct any errors. The process allowed me to utilize the member checking process to gather feedback from participants to avoid misconceptions of the data collected (see Maxwell, 2013; Sandelowski, 2008). Member checking enables the researcher to reinforce the validity of the qualitative study by

integrating the participants within the process for the most accurate data (Sandelowski, 2008).

In the next phase, the data was collected and reviewed through the field notes from observations, journal notes, and interview data to look for emerging patterns and themes. The next step consisted of organizing the data using Nvivo (see Creswell, 2009; Patton, 2014). Nvivo, a qualitative analysis software package, allowed for data to be organized and analyzed (see Maxwell, 2013).

After data collection, all of the participants' information was read and reviewed. A further analysis of the transcripts and field notes guided the data analysis process to identify codes leading to patterns. As the patterns came together, the next stage consisted of reducing the data to concentrate on emerging themes and categories. I developed a diagram to capture the data represented in the study to explore the meanings advanced through data interpretation (see Creswell, 2009; Janesick, 2011; Patton, 2014). The diagram was used as part of the data analysis strategy to present and display the data (see Maxwell, 2013; Miles & Huberman, 1994). Miles and Huberman (1994) explain using diagrams, matrices, charts, and other various methods to display data can assist with the decision to move to more data analysis or whether to draw preliminary conclusions based on what is happening with the data.

I used an analytical framework to provide the best approach to report the findings in this study. The initial data analysis phase incorporated inductive analysis to generate new data through investigation and immersion of the raw data (see Patton, 2015).

Issues of Trustworthiness

The standards of evaluating qualitative research vary across methodology experts (Creswell, 2013; Miles & Huberman, 1994). Assurance of trustworthiness in qualitative research requires researchers to demonstrate that the study's findings are reliable and valid (Miles & Huberman, 1994; Patton, 2014). In order to evaluate qualitative research, Creswell (2013) refers to validation as a method to convey accurate findings through established validation strategies. The validation strategies include (a) prolonged engagement and persistent observation, (b) peer review or debriefing, (c) negative case analysis, (d) clarifying research bias, (e) member checking, f) rich, thick description, and g) external audits (Creswell, 2013). Four criteria coined by Lincoln and Guba (1985) are credibility, transferability, confirmability, and dependability. For the purposes of the study, the traditional approached by Lincoln and Guba (1985) was used; however, the validation strategies were intertwined within the four quality criteria to discuss the quality of the research (see Creswell, 2013).

The researcher should identify any perspectives or biases that may contribute to the interpretations and findings of the study (Creswell, 2013). Creswell (2013) describes reflexivity as the researcher discussing experiences and biases to position oneself within the study. The use of reflexivity and triangulation within a study supports confirmability by illustrating that the findings are conclusive of the participants and not the researcher's biases (Miles & Huberman, 1994). As the research instrument and primary investigator, I integrated my personal experiences working in a shelter and my past relationships with

the participants to address unavoidable bias to better interpret the conclusions of the study.

Triangulation within data analysis strengthens credibility (Creswell, 2013; Patton, 2014). Interviews can help the researcher to gather the participant's perspective and observation to assess verbal behavior, gestures, and cues that ensue throughout the study to strengthen credibility (Lincoln & Guba, 1985; Patton, 2014). The informal interactions with the administrators and other staff provided insight to capture a better understanding of the current work environment (see Patton, 2015).

Interviews were recorded to capture the data as the participants responded to the interviews questions for an accurate documentation of their statements to enhance dependability. Each study participant reviewed their responses to ensure quality, trustworthiness, and credibility. Member checking encourages participant involvement to enhance credibility. Participant involvement ensures the information collected and understood by the researcher reflects the intended responses (see Creswell, 2013; Patton, 2002).

Transferability enhances external validity, as compared to quantitative research, by generalizing the findings in one study and applying it to other settings, time, and people. The study included thick and detailed descriptions of the data to establish transferability and consistency across the study. The detailed descriptions of the study may help to expand opportunities for readers to recreate the context of the study to other settings (see Creswell, 2013; Maxwell, 2013).

Ethical Procedures

Research requires ethical procedures for incorporation throughout the entire study. It is important to address any ethical concerns or issues when they arise (Maxwell, 2013). Although there was no intent of the study to impose any potential ethical issues, the study required approval through Walden University's Institutional Review Board (IRB). The research was approved by Walden University's IRB # 08-16-16-0353881.

Potential research participants received an informed consent to explain the study's purpose before they become involved in the study. Although there was no immediate risk, the interview questions inquired of experiences working in a disaster shelter. The participants were given the option to withdraw from the study at any time.

The participants were informed their identities would be protected from non-identifying data maintained on the interview protocol forms and confidential coding after data collection. An external hard drive was used to store the collected data without coded names and work locations of the participants to ensure confidentiality. All information from the documents maintained throughout the research will remain stored on the external drive for 5 year period. The external drive containing the files will remain under my supervision to secure the information. At the end of 5 years, the external drive will be deleted. The interview transcripts are on the external drive and the paper copies will be shredded after dissertation submission.

Dissemination of Findings

The findings from the study will be disseminated through submission of the information to peer-reviewed journals for publication. Researchers may inquire about the

findings for use in future studies. Each participant will receive a summary of the findings.

Summary

Chapter 3 included the phenomenological methodology used in the study to explore the perceptions of public health providers in the use of EHR systems. This chapter also included the selection of participants, the data collection methods, interviews and observation, and the data analysis plan used in the study. Chapter 4 will include the study's findings. This chapter will further explain the data collected in the field setting, data analysis, and the results.

Chapter 4: Results and Findings

The purpose of this qualitative, phenomenological study was to explore public health providers' perceptions of the use of EHRs in a disaster setting. The study involved interviewing public health providers, whom I recruited using criterion and snowball sampling. A total of five nurses, one nurse practitioner, and one physician were interviewed. I used the ITSA framework to develop the interview questions regarding new technology and the existing environment. I developed the following primary research questions: What are the lived experiences of public health providers in Louisiana regarding the meaningful use of EHRs in a disaster setting?

I also developed three subquestions:

1. What are reasons, if any, that public health providers perceive the use of EHRs as useful?
2. What do public health providers perceive as barriers to providing healthcare during emergencies and disasters?
3. What positive and negative experiences, if any, have public health providers encountered that may affect their clinical decisions in providing patient care in the absence of electronic health records?

In Chapter 4, I discuss the details of data collection details and the setting. I also explain how the pilot study was carried out and the data analysis procedures I used.

Pilot Study

Walden University's IRB granted me approval to conduct the pilot study, which I conducted to validate the questions. The healthcare professional participants were selected based on their expertise and willingness to participate. The three pilot study participants included experts in public health, informatics, and emergency preparedness. I asked participants to provide feedback on the interview questions and provided them with the study's aims. I asked them if the questions sufficiently elicited healthcare providers' perceptions with the intent of understanding the environment and the implementation of EHRs. Their feedback did not warrant modification to the interview guide, but there was a need to further explain some of the questions to ensure the participant understood what I was asking.

Specifically, I added details for further clarification of Question 6 (Appendix C) to discuss the participant's involvement in the planning or implementation of the EHR in their current work setting. Also, there was a need to further explain Question 5 (Appendix C) related to debate about adoption and implementation of EHRs among healthcare providers and administrators in the primary care settings and acute care settings.

Setting

I asked the participants their preference as to where and how they would like me to conduct the interview. Two options were given: phone or face -to- face. I conducted all seven of the interviews over the telephone. Four of the participants selected times outside of work hours because of convenience and privacy.

During the year before this study, the organization where the public health providers worked experienced workforce changes because of a reduction in staff resultant from retirements and budget cuts. At the same time, a new EHR system was implemented. Health units that were staffed with several nurses in the past were now staffed with only one nurse. These factors might have influenced some of the responses and low participation.

Demographics

The participants completed a screening questionnaire that asked whether they were a nurse or physician, and if they had any experience working in a disaster shelter (Appendix B). Of the seven participants, five were nurses, one nurse practitioner, and one physician. All participants had experience working in a shelter at least one time as a public health provider. Participants had between 10 to 14 years of experience working in the public health sector. All of the participants were currently using an EHR system in their organization.

Table 2

Participant Demographics

	Healthcare provider type	Years of experience	Number of times worked in a disaster shelter
Participant 1	Registered Nurse	10-15	3
Participant 2	Registered Nurse	10-15	3
Participant 3	Registered Nurse	10-15	4
Participant 4	Nurse Practitioner	10-15	2
Participant 5	Registered Nurse	10-15	4
Participant 6	Registered Nurse	10-15	1
Participant 7	Physician	10-15	3

Data Collection

I mailed a recruitment letter to potential participants asking them to volunteer for the study. The letters were mailed in phases. The first phase targeted public health nurses in the Shreveport and surrounding areas, and the second phase targeted public health nurses in the Monroe area. In the third phase, participant letters were sent to public health nurses in Alexandria and surrounding areas, and the final phase targeted public health nurses in Baton Rouge.

The entire list of registered nurses and nurse practitioners in Louisiana, as reported by the Louisiana State Board of Nurses, consisted of over 23,000 individuals.

Because of the large number of nurses and the inability to specify public health nurses, I targeted nurses from the areas more likely to have opened shelters for disasters.

I collected data over a 5 month period from December 14, 2016 to June 27, 2017. I sent 135 letters through the United States Postal Service to public health nurses and physicians in Shreveport, Bossier, Alexandria, and Baton Rouge and surrounding areas. The mailing material included a participant letter (Appendix A) and a screening questionnaire (Appendix B). After receiving interest from a potential participant, I emailed or mailed a consent form.

After the first phase, two nurses responded via email with an interest to participate and having completed the screening questionnaire. After reviewing the questionnaire, I determined the two nurses did not meet the criteria related to experience in a disaster shelter. I sent them an email thanking them for their willingness to participate and notifying them they did not meet the specified study criteria. Subsequently, three nurses who met the criteria responded via email with an interest in participating. After receiving the responses, I sent the interested participants an email with the consent form and attempted to schedule a convenient time and/or place to meet the participants. After not hearing from them again, a follow-up email was sent within two weeks. I set up and conducted two interviews, and one participant did not respond.

A second letter was sent within three weeks of the first letter to recruit more participants. Because of the low response, I requested and was granted IRB approval to add snowball sampling in an attempt to recruit more participants. The participants interviewed were asked if they knew of any willing individuals who met the inclusion

criteria and who would be interested in participating. One participant provided contact information and the other two individuals forwarded the participant letter (Appendix A) to their contacts. As a result, five additional participants responded.

After receiving permission from the participants, I used an audio recorder to record all of the interviews. I transcribed the interviews after listening to the recordings and combining interview notes. The interviews lasted between 25 and 42 minutes. All participants were interviewed once and given a participant number. I mailed and/or emailed a copy of their interview transcript within two weeks so that they could review the transcripts and provide any comments or edits. Five participants did not have any edits.

The data collection plan varied from the initial plan introduced in Chapter 3. The initial data collection plan consisted of working with the Louisiana Department of Health to disseminate the recruitment letter (Appendix A), screening questionnaire (Appendix B), and consent form. The first contact with one member of the organization's leadership team went well. After meeting with another member of the leadership team, I learned that employees were dissatisfied with the current EHR system and that the organization would not be willing to participate in this study. I instead decided to use resources from the Louisiana State Board of Nursing (LSBN) and the Louisiana State Board of Medical Examiners (LSBME) for potential participants.

After IRB approval, I purchased lists from both the LSBN and the LSBME. In order to efficiently reach the target population, snowball sampling was added to include

the specified targeted population. Participants were willing to reach out to get contact information for potential participants.

Data Analysis and Results

I interviewed seven participants using the semi-structured interview guide. All participants were assigned a participant number. After collecting the data, the interviews were then transcribed after reviewing the audio recordings and interview notes. Within 2 weeks of their interview, I mailed and/or emailed the transcript to the participants for their review. Two participants decided their transcripts did not need a review and the remainder of the five participants accepted the transcripts without any revisions.

I used the NVivo Version 11 Pro software program to organize the data. I read all of the transcripts to get an idea of what the participants were saying and to identify key concepts to develop my first concept map. The transcripts were then entered into NVivo Version 11 software. I used the word frequency feature in NVivo 11 to identify the most commonly used words (Table 3).

The interview questions (Appendix C) were formulated to allow participants the opportunity to respond and to discuss their lived experiences working in a disaster shelter. I collected and analyzed responses to answer the main research question and the three sub-questions. I asked a total of 15 questions with some variation depending on the flow of the interview: the last question allowed participants to ask questions or make additional comments. The interview questions answered more than one research questions. Each participant's response was analyzed to identify patterns and themes.

Interview Questions 1, 3, 6, 11, 12, and 14 were formulated to answer the primary research question: What are the lived experiences of public health providers in Louisiana regarding the meaningful use of electronic health records in a disaster setting?

Interview Question 1: Let's begin by talking about your experience working in a disaster shelter?

In this question I asked participants to "begin my talking about [their] experience working in a disaster shelter." This question provided an introduction to allow the participant to discuss their experiences working in a complex shelter environment. Most participants agreed it was a different environment than their usual work environment. Three participants specifically referenced the work hour shifts having to go from the typical 8 hour work day to 12 hour shifts during an emergency response.

One participant noted that the shelters were different across the state as far as their population make-up and that each disaster event reformed a new experience. "Well I have always heard that if you work one shelter, you've worked one shelter because it's never any, I mean they are similar yeah, but there is so much changing day to day at every event is different. Whether it is, you know, back to back hurricanes or whatever, every event is different." Another participant expressed their joy working in a shelter and seeing the outcome as individuals returned home or to other facilities in comparison to a participant that shared they did not look forward to working in the shelter.

Interview Question 3: Describe your typical day working as a provider at the shelter.

The responses were mixed with total patient care, physician medical oversight, and supervisory duties. Some respondents provided basic nursing care such as providing respiratory care, observation for any changes in medical status, dressing changes, and taking care individuals with limited mobility requiring assistance with daily activities. One of the participant's role included triaging incoming individuals to determine if they met the criteria for shelter admission based on their medical needs or if they needed to be transported to the hospital for a higher level of care.

In most scenarios, individuals had family caregivers, persons who provide some assistance with basic daily needs and healthcare needs, with them. One participant explained part of their role included determining which medications the individuals had and the medications they needed so they could write the appropriate prescription. One participant described the care similar to hospital care but what you would do in a shelter or as another participant referred to it as field setting. Some participants were also part of the leadership team where they reported on shelter status, shelter population numbers, and resource management needs.

Interview Question 6: What is your view on electronic health records and have you utilized an electronic health record system before?

All respondents commented their use of an EHR system in the past. Most participants discussed their views early in the interview session about their use of EHR systems in the clinical work setting and the challenges with the system. As a result, one

participant responded the programs selected should be vetted by staff that will utilize the system. The participant further explained that the program should align with the services provided and the program should be able to function not only for statistical data for performance measures but the type of program selected should function in the clinical setting as well. Another participant talked about technology support and the importance to have the personnel able to manage the technical support. A participant reiterated from an earlier question that there were limitations with EHR systems such as not interfacing with other programs they utilize on a daily basis.

Interview Question 6a: If you have utilized an EHR system before, what are some of the challenges you faced using it?

Three participants talked about the technology infrastructure failures where the system goes down on a daily basis. Of those**,** one participant discussed the frustration of how the staff has to revert to the back-up paper method when the system goes down. The participant further explained the time it takes to enter the data can cause a backlog. Another participant added although the system goes down, it usually does not take a long period of time to get it back operational while the staff relies on paper to use as a back-up method. The other participant also mentioned the difficulty transitioning between screens and added, "There's some "clunkiness" about the system that is unfortunate." The participant recognized the advantages outweighed the disadvantages and focused on the positive features of the EHR system.

Another participant expressed that although EHRs can be cost-effective it is important not to get caught up in that aspect of it and lose sight in caring for the patient.

One participant commented when the patient's data is entered incorrectly it takes time for the data entry error to be corrected. These types of errors could negatively impact the statistical outcomes that track the patient's time spent in the clinic.

A different participant reported staff training as a challenge and proposed that training be geared to the particular work setting. For example, training in a hospital setting should be different from training in a clinical setting. Also, it was noted the person providing the training should be someone who typically works in that clinical setting.

Interview Question 6b: If you utilized an EHR system before, what are some of the benefits?

One participant responded the ability to retrieve records and to see what medications were prescribed, treatments, and to see where the patient received care was a major benefit. Three participants agreed the EHR systems are beneficial in helping to reduce duplication of services. In congruence, two additional participants agreed EHR systems helped with continuity of care. One participant mentioned the EHR system was helpful in tracking patients in their clinic waiting rooms to help ensure no patient was missed. It was also helpful to track down labs without having to make phone calls to the lab department because it was available in the EHR system. Another participant discussed the use of EHR systems as it relates to resource management.

Interview Question 6c: What, if any, problems you encountered with the design of the EHR system?

The participants are using a new EHR system implemented within the past two years in their clinical work setting. Most of the participants felt the EHR system needed to be designed for the type of clinical setting you are working in. In addition, the templates within the EHR system needed to be designed with the end user in mind. Of those, one participant discussed the need for EHR systems to interface while another participant added the standardization of training and implementation of EHR systems is important.

Two participants expressed a need for standardization of workflow. It was also suggested that a guide or workflow diagram would have been helpful to integrate the workflow of the EHR system in their clinical setting. At least one of the participants had some involvement in the planning stages of the EHR system and another participant contributed to the implementation phase of the EHR system.

Interview Question 6d: What do you feel would be the differences in your work setting compared to the disaster?

Five participants felt the disaster setting would be a difficult setting. Of those**,** one participant noted the flow of patients would differ from their work setting compared to the disaster setting. The participant added, "And I think that the disaster setting isn't conducive to, I mean, far from it being just a disaster, still not conducive to the way EHR is set up." Another participant agreed and did not think operating an EHR system in the midst of a chaotic environment would be feasible. While the other participant suggested

the logistics of each shelter would make it difficult, it would possibly bring more organization within the shelter. Also, the training needs would need to occur before transitioning to the shelter.

One participant raised the point that although there are advantages when using EHR systems with improving patient outcomes and continuity of care, because of the quick paced environment, it would not be feasible in this setting. Another participant suggested an EHR system could possibly work in the disaster setting if there were no system problems and the patient's information was linked to other healthcare facilities. This participant did not feel the current EHR system in the work setting would be beneficial in the disaster setting. The participant felt since there was a need to rely on paper as a back-up method, they preferred the paper method.

One participant perceived the disaster setting would actually run smoother. The type of patient care differed from the type of care given in the work setting. Another participant felt there was some usefulness in having an EHR system in the disaster setting and had experience with using a similar system in the disaster setting without the "complexities of a commercial system."

Interview Question 11: Are you concerned that adding an electronic health record system into your daily workflow would create any barriers or challenges? If yes, what are the barriers you foresee? If no, how do you think it will improve healthcare delivery within the shelter?

Five participants responded they were concerned with the EHR system creating barriers and challenges in the workflow. Two participants related their concerns to staff

training needs. The participant further stated, "You add another EHR into the mix for shelter duty where you only go over it once a year in … [an annual] training and you're going to put a lot more stress on people." Another participant pointed if the end user was not involved in the implementation process or at least the planning stages, this could create challenges. One of the participants voiced privacy concerns that may come up from the patient while another participant expressed if the system went down then that would create challenges. The participant added although the system might go down, they did not perceive it to be a big challenge in the shelter setting.

Two participants answered they were not concerned with any barriers or challenges. One of the participants added, "The only barrier that it would create is for those who are resistant to that change." The other participant mentioned with EHRs it is about time management.

Interview Question 12: When you consider the physical layout of the shelter you worked in, do you perceive any barriers with EHR implementation (portable computer versus stationary works stations versus laptops)?

Five participants agreed that portable systems would work better according to the physical layout of the shelter. The use of IPads, tablets, laptops, or laptops on wheels would work in this setting. One participant responded you would need input from each shelter due to the variations in the shelter layout. At least three participants were worried about theft of the computers on site. It was also mentioned space and electricity could pose barriers to EHR implementation.

Another participant expressed their concerns with cost factors. **"**The problem is it always cost money and it becomes obsolete quickly and so systems they develop and hardware that they purchase are out of date in 2-3 years. And the numbers of system you gonna have to purchase if want to do that would be expensive. So financing all that and then updating it and keeping the IT going and all that, if you don't especially have support from the federal government it would be a challenge."

Interview Question 14: What organizational policies do you perceive will need to be implemented if EHRs are useful?

Two respondents did not think it any additional organizational policies were needed. The organizational policies in the work setting would be sufficient and would be appropriate for the disaster shelter as well. Five participants agreed that policies for the disaster setting were needed. It was suggested that policies should cover password protection, privacy concerns, and to reduce the requirements to maintain both paper records along with electronic records.

Interview questions 7, 8, and 9 focused on responses developed to answer sub-question 1: *What are reasons, if any, that public health providers perceive the use of electronic health records as useful?*

Interview Question 7: How were you able to address the medical needs of the individuals within the shelters?

The majority of the participants reported they felt they were addressing the health needs of the individuals within the shelter. One participant reported because the individuals within the shelters did not have acute needs and only needed assistance with

dressing changes, electricity for oxygen needs, and that most of the individuals did have caregivers, it was perceived the needs were met. The participant explained they did not provide a lot of medical care but noted that each shelter was different.

Another participant recounted they depended on the caregiver for the medical history information. One participant suggested EHR systems could have provided a quicker way to obtain a medical history and past medications. The participant responded, "That would have made it easier, quicker instead of us having to translate all of that." One of the participants agreed they addressed the medical needs within the shelter but realized during the interview question utilization of EHRs could have assisted with resource management and communication with other staff within the shelter.

Interview Question 8: What kinds of concerns, if any, do you have with an electronic health record system within a shelter?

Two participants expressed power failure concerns within the shelter and that the shelters did not have the capacity to operate. It was also noted that not being familiar with another type of EHR program within the shelter could be concerning and equipment safety was an issue.

One of the participants voiced that EHR systems could slow them down in the shelter. While not specifically slowing them down, another participant felt if the power failed and they had to use paper records as a back-up method, this would contribute to staff having to do duplicate work. The other participants did not communicate real concerns but added the level of user access could pose a potential problem allowing

support staff to see personal information for patients and that the system would need to be functional and tailored for a disaster setting versus a clinical or hospital setting.

Interview Question 9: What are your perceptions of how implementation of an EHR system will impact providing care in a disaster shelter?

Although the responses varied, all of the participants expressed positive aspects of how EHR implementation could impact providing care in the shelter. The most reported response was the EHR system could assist with obtaining medication history and communicating pharmacy needs. One participant added it would increase the patient's confidence because most healthcare settings are now equipped with EHR systems. Another participant suggested there would not be any different to the quality of care provided but that you could obtain statistical data to aid in future disasters.

Interview questions 1, 4, 7, 9, 19, and 13 were the basis for answering sub-question 2: *What do public health providers perceive as barriers to providing healthcare during emergencies and disasters?*

Interview Question 1: Let's begin by talking about your experience working in a disaster shelter?

This question provided an introduction to allow the participant to discuss their experiences working in a complex shelter environment. Most participants agreed it was a different environment than their usual work environment. Three participants specifically referenced the work hour shifts having to go from the typical 8-hour work day to 12-hour shifts during an emergency response.

One participant noted that the shelters were different across the state as far as their population make-up and that each disaster event reformed a new experience. "Well I have always heard that if you work one shelter, you've worked one shelter because it's never any, I mean they are similar yeah, but there is so much changing day to day at every event is different. Whether it is, you know, back to back hurricanes or whatever, every event is different." Another participant expressed their joy working in a shelter and seeing the outcome as individuals returned home or to other facilities in comparison to a participant that shared they did not look forward to working in the shelter.

Interview Question 4: What were the biggest challenges you experienced working in the disaster shelter?

Each participant explained their challenges in a unique way that differed across the spectrum. One participant responded the biggest challenge was the accommodations. Another participant responded, "I think the medical special needs shelter was intended to provide support care but in essence I think they tried to turn it into almost a mini MASH unit."

One participant pointed out the experience and skills of nursing staff was a challenge while transitioning from preventative public healthcare to acute care. An advanced nurse practitioner stated the challenge stemmed more from not knowing the exact dosage and frequency of medication the individual was on before the disaster. "I just don't know and they don't bring their bottles with them, and they are not for sure the dosage, the doctor's office is closed down, it makes it very difficult to find out is that truly the dosage that they are on and the frequency."

Another challenge was the concern that something could possibly go wrong with a patient that would need a higher level of care in spite of available emergency staff such as ambulance workers that were present. One participant expressed a challenge when a disaster happens and there is no notice involved for individuals to prepare for evacuation which poses a challenge to providing care. It was also noted when other healthcare resources such as pharmacies were affected and how this introduced more challenges to providing care within the shelter.

Another participant agreed that the limited resources available during a time of disaster made it much more challenging to manage care but felt that everyone did the best they could do and lives were saved. The participant further explained "the absence of electronic health records was also a very big problem because you can't document effectively what you are doing and then you don't have you can't go back and query about the kinds of, easily anyway, you can't go back and query the type of illnesses and ages."

Interview Question 7: How were you able to address the medical needs of the individuals within the shelters?

The majority of the participants reported they felt they were addressing the needs of the individuals within the shelter. One participant reported because the individuals within the shelters did not have acute needs and only needed assistance with dressing change, electricity for oxygen needs, and that most of the individuals did have caregivers, it was perceived the needs were met. The participant explained they did not provide a lot of medical care but noted that each shelter was different.

Another participant recounted they depended on the caregiver for the medical history information. One participant suggested EHR systems could have provided a quicker way to obtain a medical history and past medications. The participant responded, "That would have made it easier, quicker instead of us having to translate all of that." One of the participants agreed they addressed the medical needs within the shelter but realized during the interview question utilization of EHRs could have assisted with resource management and communication with other staff within the shelter.

Interview Question 9: What are your perceptions of how implementation of an EHR system will impact providing care in a disaster shelter?

Although the responses varied, all of the participants expressed positive aspects of how EHR implementation could impact provide care in the shelter. The most reported response was the EHR system could assist with obtaining medication history and communicating pharmacy needs. One participant added it would increase the patient's confidence because most healthcare settings are now equipped with EHR systems. Another participant suggested there would not be any different to the quality of care provided but that you could obtain statistical data to aid in future disasters.

Interview Question 10: What are your perceptions of how implementation of an EHR system will impact providing care in a disaster shelter?

At least two participants believed there was a need to transition to an EHR system. One of the participant's responded not implementing an EHR system would not show any growth. The participant stated, "You know we have more disasters we have to be more technology savvy during these disasters." While the other participant suggested

a need to eventually shift to EHR systems in shelters to align with EHR utilization in the work setting. One participant responded the care would continue as before and there would be a gap in obtaining medical history information but stated it depended on the type and frequency of the disaster.

One participant proposed EHR systems would be helpful if participants did not disclose their medical history, then that could impact the care provided. Two participants answered they did not think there would be any impact on providing care if no EHR systems were available but one of the participants pointed out more organization and accurate care. One participant responded that it really revolves around resources and the availability of those resources.

Interview Question 13: What are your perceptions related to how communications within the shelter may be improved or altered?

Three participants agreed EHR implementation could improve communication in the shelter setting. One participant responded in the disaster setting you should be able to eliminate meeting the meaningful use requirements that are necessary for the clinical setting and "you can focus more on the patient and getting the job done in an emergency situation." Another participant added nurses are used to reporting on and off to nurses between shifts. One participant responded, "So I mean I think it would be an awesome thing with communication and a lot less leg running to try to find people."

Four participants perceived EHR implementation could negatively alter the communication within the shelter. Some of the comments included "if it's not on one of

the check boxes it doesn't get mentioned" and "you have to almost disengage yourself from the computer for a second to actually grasp what's going on with the patient."

Interview questions 2, 4, 5, 7, 10, and 13 were developed to answer sub-question 3: *What positive and negative experiences, if any, have public health providers encountered that may affect their clinical decisions in providing patient care in the absence of electronic health records?*

Interview Question 2: Can you talk to me about your previous experience?

Four participants are involved in patient care in public health clinics in their daily routine, one participant managed staff and did not routinely do patient care, and two participants were involved in patient care in public health clinics as well as management activities. Two participants mentioned they utilized electronic health records in their clinic setting.

Interview Question 4: What were the biggest challenges you experienced working in the disaster shelter?

Each participant explained their challenges in a unique way that differed across the spectrum of responses. One participant responded the biggest challenge was the accommodations. Another participant responded, "I think the medical special needs shelter was intended to provide support care but in essence I think they tried to turn it into almost a mini MASH unit."

One participant pointed out the experience and skills of nursing staff was a challenge while transitioning from preventative public healthcare to acute care. An advance nurse practitioner stated the challenge stemmed more from not knowing the

exact dosage and frequency of medication the individual was on before the disaster. "I just don't know and they don't bring their bottles with them, and they are not for sure the dosage, the doctor's office is closed down, it makes it very difficult to find out is that truly the dosage that they are on and the frequency."

Another challenge was the concern that something could possibly go wrong with a patient that would need a higher level of care in spite of available emergency staff such as ambulance workers that were present. One participant expressed a challenge when a disaster happens and there is no notice involved for individuals to prepare for evacuation which poses a challenge to providing care. It was also noted when other healthcare resources such as pharmacies were affected and how this introduced more challenges to providing care within the shelter.

Another participant agreed that the limited resources available during a time of disaster made it much more challenging to manage care but felt that everyone did the best they could do and lives were saved. The participant further explained "the absence of electronic health records was also a very big problem because you can't document effectively what you are doing and then you don't have you can't go back and query about the kinds of, easily anyway, you can't go back and query the type of illnesses and ages."

Interview Question 5: What are your thoughts on the current debate about the adoption and implementation of electronic health records?

The participants responded to this question based on their current use of electronic records within the clinical setting. One participant explained how important an effective

training and manual is important for successful adoption and implementation of electronic records. Their experience with training as involved a method of learning as you utilize the system. In the end, the participant added overall they liked the EHR system.

Another participant cited the EHR program selected was important. The right program is needed to fit the setting. The participant acknowledged a difference in utilization between the younger and older generation. In their opinion of staff they managed, the older staff preferred paper and did not want to let go of their back-up paper method system. The younger staff did well EHRs.

One participant mentioned they experienced benefits using the system but felt that it could deter the attention away from the patient. They further expressed the lack of eye contact they experienced and how provides might get caught up in the time it takes to complete steps in the computer versus time needed to provide hands on patient care. Similarly, one participant commented it takes more time to input the data into the computer system and felt it was inefficient; however, the positive benefits outweigh the negative benefits.

Another participant noted that in theory, EHRs are great but in reality they felt it slowed them down and prevented them from seeing more patients. Two participants agreed that EHR use does help with continuity of care and improving patient outcomes. Two other participants noted the limitation of EHR systems to be compatible with other EHR systems. One of the participants felt that most of the doctors in their local

community area objected to certain components of the Affordable Healthcare Act and did not want to adopt EHR systems.

Interview Question 7: How were you able to address the medical needs of the individuals within the shelters?

The majority of the participants reported they felt they were addressing the health needs of the individuals within the shelter. One participant reported because the individuals within the shelters did not have acute needs and only needed assistance with dressing change, electricity for oxygen needs, and that most of the individuals did have caregivers, it was perceived the needs were met. The participant explained they did not provide a lot of medical care but noted that each shelter was different.

Another participant recounted they depended on the caregiver for the medical history information. One participant suggested EHR systems could have provided a quicker way to obtain medical history and past medications. The participant responded "that would have made it easier, quicker instead of us having to translate all of that." One of the participants agreed they addressed the medical needs within the shelter but realized during the interview question utilization of EHRs could have assisted with resource management and communication with other staff within the shelter.

Interview Question 10: What are your perceptions of how implementation of an EHR system will impact providing care in a disaster shelter?

At least two participants believed there was a need to transition to an EHR system. One of the participant's responded not implementing an EHR system would not show any growth. The participant stated, "You know we have more disasters we have to

be more technology savvy during these disasters." While the other participant suggested a need to eventually shift to EHR systems in shelters to align with EHR utilization in the work setting. One participant responded the care would continue as before and there would be a gap in obtaining medical history information but stated it depended on the type and frequency of the disaster.

One participant proposed EHR systems would be helpful if participants did not disclose their medical history, then that could impact the care provided. Two participants answered they did not think there would be any impact to providing care if no EHR systems were available but one of the participants pointed out more organization and accurate care. One participant responded that it really revolves around resources and the availability of those resources.

Interview Question 13: What are your perceptions related to how communications within the shelter may be improved or altered?

Three participants agreed EHR implementation could improve communication in the shelter setting. One participant responded in the disaster setting you should be able to eliminate meeting the meaningful use requirements that are necessary in the clinical setting and "you can focus more on the patient and getting the job done in an emergency situation." Another participant added nurses are used to reporting on and off to nurses between shifts. One participant responded, "So I mean I think it would be an awesome thing with communication and a lot less leg running to try to find people."

Four participants perceived EHR implementation could negatively alter the communication within the shelter. Some of the comments included "if it's not on one of

the check boxes it doesn't get mentioned" and "you have to almost disengage yourself from the computer for a second to actually grasp what's going on with the patient."

The participants were asked to add additional comments or questions they felt were not covered. One participant answered this question.

Question 15: Do you have any comments or questions you would like to add? One participant responded they could see how the workflow could be improved with EHR systems and how they can be useful. It was also noted utilizing an EHR system specifically designed for a disaster setting would be optimal. You could introduce the training before the disaster happened to become familiar with the program. "It couldn't hurt to have them but I'm sure we can function without it."

After analyzing the responses, I classified and interpreted the data and started to code the data by breaking it down to smaller categories using the nodes feature in NVivo 11. After analyzing the data line by line and reviewing the most commonly use words and removing the words shelter, electronic, EHR, records, 34 codes were identified (Table 4). The top 12 codes are displayed and explained further in Table 5.

Table 3

Top 25 Word Frequency Query Report

Word	Count	Word	Count
Health	156	See	70
System	156	Things	70
Know	150	Care	69
Like	150	Implementation	69
Patient	150	Going	65
Working	147	One	65
Just	137	Really	63
Need	130	Nurse	62
Think	116	Providing	61
Time	105	Using	60
People	89	Day	59
Medications	77	Setting	57
Get	70		

Table 4

Codes

Acceptance challenges	Equipment safety	Patient security and privacy	System design
Accommodations	Expectations vs. reality	Physical environmental challenges	Technical support
Addressing medical needs	I think	Policy requirements	Training
Changes to communication	Improving efficiency for resource management	Population served	User's comfort level
Compatibility vs. limitations	Increased workload	Positive benefits	We/they phenomenon
Cost implications	Infrequent activations of emergency shelters	Previous experiences	Work arounds
Cost saving benefits	Moving from patient care	Resistance	Work setting
Desired patient outcomes and continuity of care benefits	Patient safety	Shared ownership	Workflow
Engaging the end user	Patient satisfaction and confidence	Standardized implementation process	

Table 5

Top 12 Codes

Codes	Quotations	Number of references
"I think"	1) "I think again the logistics of setting it all up and that really actually depends on the different shelter because like I said every shelter is equipped with a lot of stuff or little stuff." 2) "So I think getting the right people at the table" 3) "I don't think, well there would be some barriers, but I think as long as they would allow field staff to help with the implementation or at least the planning stages of it then that would help."	86
Workflow	1)"Actually it will probably be a lit bit smoother in the shelter" 2) "We did the paper records as far as my experience with it, I felt like it went smoothly." 3) "You would have to get another type of EHR program that's specific to shelter work"	76
Positive benefits	1) "It couldn't do anything but be beneficial." 2) "It does help with the continuity of care I mean that's a very solid argument." 3) "It does help with the continuity of care I mean that's a very solid argument."	54
Addressing medical needs	1) "It was based on what the client told us and what the caregiver, if there was one present, told us."	52

Codes	Quotations	Number of references
	2) "So I definitely think as far as patient outcomes again it would have a positive impact just because electronic health records do create more positive outcomes." 3) "Anybody in the state can pull up and see where that patient went, what was done, what meds were given, you know all of that."	
Work setting	1) "I think mobile would work better and that way you can do more charting at the bedside." 2) "So if you build electronic records strictly for that setting" 3) "And I think that the disaster setting isn't conducive to, I mean, far from it being just a disaster, still not conducive to the way EHR is set up."	49
Expectations vs. reality	1) "So with a good electronic health records that's accessible though throughout and just not in your little network." 2)"The challenge with that to me is our systems are not interfaced with electronic health systems" 3) "You want it to perform not only with your logical statistical data; you also want it to be able to perform at the bedside."	47
Desired patient outcomes/continuity of care benefits	1) "So I definitely think as far as patient outcomes again it would have a positive impact just because electronic health records do create more positive outcomes." 2) "I mean if you have an	46

Codes	Quotations	Number of references
	electronic health system I think it would help more to give better patient care and then to communicate better." 3) "and you can verify with what the patient tells you with what the pharmacy"	
Previous experiences	1) "right now one of those challenges is when that system goes down" 2) "every day is a new challenge with that electronic health record" 3) "And so with the implementation of electronic health records I find that the younger generation does well with them, the older generation, the ones who have been on paper, do not."	41
System design	1) "The design of ours is, it's not designed, almost with a, nursing know- how kind of input." 2) "It is so vital to get the correct one for the place that you are working." 3) "When you document on the templates, how it translates into your actual documentation may not read exactly how you want it to." 4) "	41
Compatibility vs. limitations	1) "They need to interface" 2) "If it worked ideally where as you could type the patient name or birthday or whatever and get all the linked information from their healthcare provider" 3) "So with a good electronic health records that's accessible though throughout and just not in	34

Codes	Quotations	Number of references
	your little network." 4) "You actually spend more time entering data to a system than you actually do seeing the patients, which is intrinsically inefficient."	
Training	1) "Staff training is a big issue" 2) "You would want to do a little training ahead of time on the computer" 3) "In the beginning, if they do a statewide training, in the beginning, I think it would be useful, but beforehand not when the disaster gets here."	32
Physical environmental challenges	1) "Probably portable like something that's on wheels but not as bulky because you are looking at space and allocation for that" 2) "The layout of the shelter to me would need to be something portable like a, you need to have, IPADS or laptops, something portable." 3) "I just don't see this is going to mesh because in clinic ,our EHR ,it's kind of slow pace and in a disaster setting it's a lot quicker.	29

*some references/quotations were assigned to multiple codes

After identifying the codes and noticing patterns and themes, the codes were then reduced to themes. Six themes emerged to increase the understanding of the lived experiences of public health providers in the usefulness of EHRs. The themes identified were (a) design and workflow matters to me, (b) past experiences make a difference, (c) just ask me, (d) EHR systems can be useful, and (e) training makes a difference.

Design and Workflow Matters to Me

The majority of the participants discussed the environment within the shelter was different than the usual work setting. Participants discussed the variations in the workflow across each shelter. The work hours were different from their usual work shifts and the population and health needs within each shelter varied based on the location. Some individuals within the shelter required more hands on patient care than others. "We went from doing vital signs, giving them medications or making sure they had their medications, making sure they had food, helping them to the restroom and back to the shelter area um providing basic nursing care for the patients in the shelter."

All participants were familiar with EHRs as they were implemented within their work settings two years ago. Five participants discussed they had concerns with workflow and implementation of an EHR system in the shelter setting. It was noted the staff that is using the system needs to be involved in the planning stages as well as the implementation stages. The majority of the participants were nurses and they communicated they were not consulted in the design of their current system. "When you document on the templates, how it translates into your actual documentation may not read exactly how you want it to." Another participant cited "It's just not really nursing friendly."

The majority of the participants discussed issues with downtime and duplication of efforts with a paper back-up system. Two participants cited their feelings about the system slowing them down when seeing patients while another participant discussed the time it takes to correct data errors and how it negatively influenced their statistical

outcomes for patient tracking. It was also noted the difficulties in finding patients when an error has been made during data entry such as date of birth or spelling of the name.

One participant noted the system needs to function at the bedside as well as having the capacity to address the management needs. It was mentioned that the workflow was definitely different from the work setting from the disaster setting and the same system could not be used for both settings. The logistics of the shelter made it more difficult but two participants agreed the use of EHR systems would be better in the shelter setting than the work setting.

Another participant felt if the system worked smoothly, it would be great to use in the shelter environment. One participant added, "I don't know, I just don't see this is going to mesh it because in clinic our EHR it's kind of slow pace and in a disaster setting it's a lot quicker." Another participant expressed their concerns with losing patient contact. "Basically with the EHR you are just so consumed with making sure you check the right box, making sure you know didn't miss this, and making sure you know are on a time limit per patient and trying to get the patient out and the time limit that you know people have set up and we are just kind of getting away from the hands on care."

Most participants suggested portable computer systems would work best to compliment the workflow. There were mixed reviews to thoughts about how the implementation of EHR system could either negatively or positively influence communication between staff and patients. Five of the participants felt new organizational policies were needed that were specific to a shelter setting.

Past Experiences Make a Difference

The participants discussed the different challenges they faced while working in the shelter setting. The challenges ranged from accommodations for patients and staff, to not knowing medical history to take care of individuals, impacted healthcare systems to transitioning from public health to managing acute and chronic conditions. One participant suggested that having access to an EHR system would be helpful in documenting care provided and having a mechanism to query data for future use.

All of the participants had experience with the EHR system in their work setting. Several participants discussed their challenges with the EHR system utilized in their clinics. The limitations and downtime experienced by the system contributed to their frustrations with having to go back and duplicate their work with a paper back-up method. One participant stated, "We did the paper records as far as my experience with it, I felt like it went smoothly."

Although the participants did see benefits using the system, how it paralleled with their expectations and their reality differed. "So it's really a beautiful thing in theory now when it comes down to reality working clinic, it does slow you down." Several participants discussed their experiences with the amount of time it takes to enter data into the system and how it takes away from patient care.

Just Ask Me

Six of the seven participants were not involved in the planning or implementation phases of their EHR system within the clinic. One participant commented "So we weren't really, field staff wasn't involved in the planning. So we've seen stuff that needs to be added and stuff that was like really we didn't need that." Two participants

expressed that systems need to be vetted by staff that are going to utilize the system in the field. It was perceived this would allow for "an accurate representation of the work representation of what it is going to do in the field; which is really what you want, how do you want it to perform."

Because of the differences across each shelter, it was noted that each location required input from the staff that will work at the shelters. It was suggested that the right people should be in the discussions in the beginning stages. One participant discussed they were involved with the implementation of the EHR system and felt a part of the planning process within their work setting.

One participant indicated benefits of the system if it could link with other systems. "So with a good electronic health records that's accessible though throughout and just not in your little network. It couldn't do anything but be beneficial." The majority of the participants expressed a need for IT support personnel that are knowledgeable about clerical and clinical functions.

Electronic Health Records are Useful

All of the participants discussed the positive benefits of EHR systems and the impact to continuity of patient care and having access to the patient's medical history could help with providing improved care. Another positive benefit was indicated was the organization of workflow and communication would be improved. EHR systems could quickly identify patient census and patient tracking. The staff could flag notes within the system to let other staff know they were referring a patient for various treatment or other needs.

The majority of the participants perceived there would be improvement to continuity of care and improved outcomes with EHR implementation. Participants liked the ability to access other health records to not duplicate treatment. Most of the participants discussed the usefulness in obtaining pharmacy records and how they would really be helpful. It was noted there would be some uneasiness with a new system implemented into the shelter and it would take staff time to become familiar with the program.

One of participants stated their feelings about continuity of care and EHR systems. "Well theoretically I love it, it makes perfect sense…because it does help with continuity of care, it does help improve patient outcomes." Another participant acknowledged it was also noted that EHR systems would be beneficial and make the process easier in the shelter setting but it could be chaotic at the same time. It was also noted by several participants that if they did not have the EHR system in shelters, they would continue to address the medical needs of the patients as in the past with paper records. The drawbacks of using the EHR system were geared toward the system not working smoothly. Arguably, the majority of the participants advised there were positive and negative factors with EHR systems; however, six of the seven participants were in agreement the advantages of the system outweighed the disadvantages and that it could be managed in a disaster setting.

Training Makes a Difference

All participants expressed the importance of effective training for any new system. Some participants felt that they were in a mode of learning as you go with EHR

implementation in the work setting. One participant indicated "I honestly cannot remember how much education was given beforehand."

Two participants voiced the comfort level of the individual needed to be integrated in the training method. "Some people aren't as brave on punching buttons and just trying something. They are so afraid it's going to permanent." It was added the time allowed for individuals trained should also be considered. "You know like I said everybody's on a different level with computers."

The majority of the participant preferred some type of training manual they could refer to that addressed some of their user questions. The training needs to be tailored for the specific work setting and staff should know ahead of time the layout of the template. It was further noted the staff are not in the shelter for long periods of time so they would not be able to quickly learn the system while in the shelter. While in contrast, one participant suggested just in time training could work in the disaster.

Discrepant evidence and negative cases is important to support evidence of trustworthiness in qualitative research (Maxwell, 2013). This occurs when the research decides to keep the conclusion or adjust the findings based on. Initially in the data collection and analysis phase, my thoughts were the participants did not see EHR systems as useful because of the challenges they faced in the field with their current system. It was not known if the participants' perceptions were a true reflection of their current use of the system or the future use in a disaster setting.

After comparing the data further, connecting the participants' responses with the meanings and interpretations, and clarifying my own understanding (Miles & Huberman,

1994), it was determined that participants felt EHR systems were useful but with unanticipated challenges. The themes emerged after careful consideration of the evidence.

Evidence of Trustworthiness

Researchers should convey trustworthiness to respond to concerns of rigor in qualitative studies (Shenton, 2004). Credibility refers to the truthfulness that the findings reflect the views of the participants (Miles & Huberman, 1994). Clarifying researcher bias early in the research study can help the reader to understand how a researcher's background and experiences can influence the findings (Creswell, 2013).

I acknowledged my own personal judgements that possibly influenced my judgement and instead utilized the data to support answering the research questions (see Patton, 2015). The pilot study assisted with validating the interview questions. I compared the data with the codes on several occasions to ensure the codes identified through data analysis did not change the meaning of the responses (see Creswell, 2009). Member checking was used as a method to verify the responses were accurate allowing the participant a chance to check for errors. The study's findings aligned with the findings in the literature to demonstrate credibility.

Dependability was implemented in the study through the use of audio recordings of the interviews and field notes. After the interviews, member checking was helpful to allow participants the opportunity to review their transcript to check for accuracy and to identify any errors. The intent to have a peer review process to assess the themes and patterns did not work; however, I compared the data utilized the conceptual framework as

a construct to maintain consistency throughout the data analyzation process (see Miles & Huberman, 1994).

Transferability was demonstrated through the selected use of a purposive sampling approach, criterion sampling. The participants interviewed were selected based on meeting the criteria requirements. The criteria for this included public health providers, either nurses or doctors, who worked at an emergency medical shelter in Louisiana during a disaster event. The findings were described with thick descriptions to enable readers to transfer the information from a disaster setting to other complex settings or other professions (see Creswell, 2013; Miles & Huberman, 1994).

Confirmability was employed through the use of field notes and the use of the interview transcripts to ensure the findings are reflective of the participants' responses. I acknowledged my own personal assumptions that might have influenced the findings (see Miles & Huberman, 1994). The methods utilized in the study were explained in Chapters 3 and 4. I did not receive approval to use documents from the public health organization on needs of staff assessed through past evaluations as described in Chapter 3. Adjustments were made to incorporate triangulation. The participants were from three of the major shelter locations that provided different viewpoints. Data collected can be confirmed across a range of participants from different locations around the state (Shenton, 2004).

Summary

The purpose of this study was to examine the perceptions of public health providers and to understand if EHRs are useful in a disaster setting. In Chapter 4, I

discussed the data collection method, details of the pilot study, the data analyzed, and the findings. A total of seven participants, five nurses, one nurse practitioner, and one physician, were interviewed and data was collected. The interview protocol (Appendix C) was used to guide the interview questions. The interview questions were developed to align with the research questions.

After a review of field notes and interview transcripts, the data was entered into NVivo 11 Pro to assist with data management and organization. After data analysis, five themes emerged from the data. The themes included (a) design and workflow matters to me, (b) past experiences make a difference, (c) just ask me, (d) EHR systems can be useful, and (e) training makes a difference. A summary of each research question is described.

Research Question 1: What are the lived experiences of public health providers in Louisiana regarding the meaningful use of electronic health records in a disaster setting?

The data suggests the past experiences working in a shelter and with EHR systems that EHR systems are useful. The environment is complex in that it differs from their work environment. The staff transitions from public healthcare to managing and assisting with acute care needs and chronic disease management. Participants discussed the importance to access available medical history and especially medical information related to pharmacy history. Although they were facing challenges with their EHR systems, they did see benefits to having an EHR system in the shelter setting.

The participants wanted to be involved in the planning and the implementation stages. They felt their expertise and familiarity with the workflow and physical layout of the shelter would be integral for discussion. If a new system is implemented, the system would need to be specifically designed for shelter use. Ultimately, training practices would need to be adjusted for the end users with more effective training that is tailored for the setting. Initially, some participants acknowledged the shelter might not be the most optimal setting, they recognized the benefits. The positive aspects of EHR systems outweighed the negative aspects but it did not influence care of the patient.

Research Question 2: What are reasons, if any, that public health providers perceive the use of electronic health records as useful?

The participants indicated EHRs were useful organization of the workflow in the shelter. It was noted EHRs could quickly identify the patient's medical history and improve communication between staff. EHRs could also be beneficial for resource management, patient tracking, and patient census. It was agreed that EHR systems could positively influence care provided in the shelter. The most common gaps were identified in pharmacy needs and how the EHR system could be useful in identifying medications.

Research Question 3: What do public health providers perceive as barriers to providing healthcare during emergencies and shelters?

A few participants discussed the variation of each shelter and the type of disaster determined the level of healthcare needed. The participants felt the barriers they faced were not having access to health history and pharmacy information. When pharmacies

are impacted during a disaster, there is a gap in communicating those needs to find out what medications the patients might need.

Some participants felt that either they or other fellow staff did not possess the necessary skills to manage patient care outside of the public health setting. A few participants described their experience inside the shelter as chaotic. The limited resources, such as medical supplies, staffing, and medications, within the shelters were considered a barrier and they varied across each shelter as well.

Research Question 4: What positive and negative experiences, if any, have public health providers encountered that may affect their clinical decisions in providing patient care in the absence of electronic health records?

Most of the participants were involved in patient care in their daily work in the public health setting. One participant explained that the initial intent to provide a shelter for patients to come with their caregivers to get assistance with electricity needs for oxygen and medications has morphed into a hospital type setting. At least three participants described the shelters as a field hospital type experience. One of the participants responsible for writing prescriptions experienced patients not having their dosages or names of medications and this presented a challenge to make an informed clinical decision.

Most of the participants felt they addressed the medical needs of the individuals at the shelter. Although, the majority of the participants did say how EHR implementation could improve patient care. The participants depended heavily on the caregivers for medical history information and patient care.

Chapter 5 Interpretation Limitations, Recommendations, Implications, Conclusion

Introduction

The purpose of the qualitative, phenomenological study was to examine and understand public health providers' perceptions of the usefulness of EHR systems in a shelter setting in the state of Louisiana. Researchers have studied the use of EHRs in settings such as emergency rooms, physician offices, and rural clinics. However, there was a gap in the literature regarding the usefulness of EHRs in disaster settings and whether there is a need for EHR systems in this type of complex setting. In spite of widespread use of EHR systems, there continues to be a lack of adoption and successful implementation of these systems in non-traditional settings.

In this study, my intent was to explore the perceptions of providers who have worked in a shelter setting and to identify and understand challenges to implementation. The findings in the study showed that EHR systems were useful in the shelter setting and could improve areas such as communication between staff and workflow organization.

Out of the 135 potential participants I contacted by mail, 14 individuals responded. Two individuals did not meet the criteria and were excluded. Five potential participants who met the criteria expressed interest, and of those, two returned the consent forms. However, no interviews were set up because of lack of any further response for the remaining individuals. After using snowball sampling as a recruitment method, five additional participants expressed interest. I interviewed seven public health providers that included five nurses, one nurse practitioner, and one physician to answer

the research questions. Five themes emerged in my analysis of the interview data. These themes included (a) design and workflow matters to me, (b) past experiences make a difference, (c) just ask me, (d) EHR systems can be useful, and (e) training makes a difference.

Six out of seven participants agreed that EHR records were useful in a disaster setting. The participants reported that positive benefits included improved communication, organization, and continuity of care. Because disasters can occur at any time and may occur infrequently, participants reported some concerns that the purchase if EHR systems might not be an efficient use of resources. EHRs were accepted as useful, but the participants did not perceive the use of EHRs as influencing the patient's outcome or impacting the delivery of care.

Training needs were definitely a source of concern for the participants, and they reiterated the importance to have effective training. Further, they noted the need to have an EHR system designed for the work setting. The participants also noted that having the right people at the table during implementation and planning phases makes a difference to how the staff will adopt the system.

Another challenge to adoption was the experiences with system electricity failures and having to revert to the paper back-up method. The paper back-up method was perceived as duplication of work and frustration was felt when the data had to be inputted at a later time. Participants also reported that the physical layout of the shelter was a factor and that each individual location would need to participate in deciding the best work station since it impacted workflow.

Interpretation of the Findings

The study's findings showed that participants confronted the same challenges as those faced in other, non-disaster settings. According to McAlearney et al. (2014), despite the benefits of EHR systems, barriers are often associated with organizational, and not technological, challenges. Wang and Biedermann (2012) indicated that all EHR systems do not fit every environment. Kuziemsky (2015) reported that the implementation of systems varies according to the organizational setting. My findings were consistent with those of these researchers in that the same system used in participants' clinical work setting would not work for the disaster setting. EHR systems used during operational periods are not equipped to handle the surge capacity of unexpected patients. In other words, just as processes are streamlined in a disaster setting, programs will need adjustments as well (Bookman & Zane, 2013).

As indicated in previous studies (Hamid & Cline, 2013; Kellermann & Jones, 2013; Nambisan et al., 2013), engaging the provider in the developmental phases of EHR systems is an important factor to EHR system adoption. My findings confirmed that not having an effective training influences the adoption of EHR systems. Training that is adaptable to the level of the user and developed with the end user in mind was reported as a key factor to acceptance (Jamoom et al., 2014; Nambisan et al., 2013).

Furthermore, workflow analysis and integration did play a part in acceptance of EHR systems. As other studies have shown, involving the right people in the integration of EHR systems into the workflow process can be beneficial (McAlearney et al., 2014). Although some researchers have reported improved quality outcomes with EHR use

(Friedman et al., 2013; Nambisan et al., 2013), the findings in this study were consistent with findings from Patel and Kannampallil (2014) in that a majority of the participants perceived EHRs as useful but as not affecting improvement in patient care outcomes.

Personal experiences contributed to how individuals viewed the benefits of EHR systems. Their experience working in a shelter coupled with their experience with using an EHR system determined their decision on whether it was useful in the disaster setting. This finding confirmed the research results of Putzer and Park (2012) and McAlearney et al. (2014) that personal and past experiences played a factor in adoption. In contrast to a previous study by Malo et al. (2012), I found that perceived behavior, normative beliefs, and attitudes did play a role in influencing use of EHR systems.

Limitations of the Study

This study was limited by four factors. The first limitation in the study was the low number of participants. Although there were more nurses in other areas with shelter work experience, contacting them was difficult. The contact list for nurses in Louisiana included more than 23,000 nurses and advanced nurses not specific to public health nurses. I selected the four most common shelter areas to recruit public health nurses. The use of snowball sampling was added to increase participation in the study. As suggested by Mason (2010), more participants do not necessarily indicate more data because the goal of qualitative studies is getting to the point of saturation.

Another limitation was that more nurses than physicians participated. This is a result of the ratio of physicians to nurses in public health. There are three physicians and roughly 70 nurses in each of the selected areas. As a result, responses might not reflect

the rest of the nurses and physicians. Another limitation was that the majority of the participants were frustrated with their EHR system in the clinical setting. Therefore, some of the responses may have been related to their current use and not the perceived usefulness in a disaster setting.

A fourth limitation was related to the data collection method. Because of time constraints and participants' interview availability, all participants selected the telephone interview. By not conducting face-to-face interviews and direct observation in the traditional sense, the analysis might be limited by not including all possible observations (see May, 2000).

Recommendations

In an effort to continue to improve quality and patient safety using EHRs, it is important that best practices are developed that seek to understand stakeholders' various perspectives in the adoption and implementation of such systems. My first recommendation for future studies would be to explore other state disaster settings using qualitative methods. This study was limited to one state with a small sample size. The study could be expanded to compare states and to make comparisons across the local, state, and national levels (FQHCs). My second recommendation would be to compare the perspectives of physicians and nurses to describe other factors that might influence adoption and implementation in disaster settings.

One of the participants noted a difference in acceptance of EHR systems based on the different age groups of the staff. Another recommendation would thus be to study statistical data to compare trends in demographics, technology comfort levels of

individuals, and quality indicators. More research is needed to explore workflow models that could be designed specifically for disaster settings. Development of new strategies to address the workflow challenges of unique settings would be beneficial in improving time spent with patients.

Implications

Positive social change promotes opportunities for people and the society to make a difference for the greater good. At the individual level, the implications for positive social change in this study include improved coordinated care for individuals with health conditions that are forced to vacate their homes to evacuate their residences and leave an impacted healthcare infrastructure. Vulnerable populations may be experiencing a lack of socioeconomic resources and the added threat of a disaster can worsen their situation.

Although the healthcare providers were providing the best care during the disaster response, access to EHR systems during a disaster could be beneficial in individualized care of potential patients within the shelter. At the family level, the potential implication for positive social change enables the caregivers to communicate with the healthcare providers through an exchange of communication. This allows healthcare providers to be better informed to make clinical decisions and have timely access to health information for families that are displaced.

At the organizational level, understanding the challenges and limitations of EHR systems before implementation of these systems can guide administrators to decrease the frustration felt by the end users. The need to include the end users, particularly the nurses early in the planning stages to analyze the workflow, identify training needs, and an

agreement on the intent of the system can make a difference in how technology is perceived. EHR systems are perceived as having positive benefits; however, the existing issues experienced by those who will utilize the system can hinder the transition in a complex environment.

At the societal level, the development of federal policies to improve the information technology infrastructure including venturing out to advanced systems such as cloud-based EHR systems as demonstrated by Nagata et al. (2013) to support successful implementation. In addition, promoting policies that address patient safety and securing medical information are essential to promote positive perceptions to drive acceptance. Therefore, the need to assist other organizations and agencies to successfully implement and integrate these systems into complex settings require critical thinking skills and the right people to develop these policies.

Conclusion

Adoption of EHR records in healthcare systems has not been a smooth transition. Until the challenges to adoption are addressed, future implementation efforts of EHR systems will meet resistance. In this study, the challenges faced by the end users were associated with both organizational concerns as well as technology factors consistent with other study findings (Creswell et al., 2013; McAlearny et al., 2014; Nambisan et al., 2013). The integration of EHR systems in various settings other than hospitals poses unique challenges.

In an effort to answer the research questions, participants described their experiences in the disaster setting and discussed whether or not EHR systems were useful

in a disaster setting. The themes from this study were consistent with previous studies. The five themes included (a) design and workflow matters to me, (b) past experiences make a difference, (c) just ask me, (d) EHR systems can be useful, and (e) training makes a difference.

I used the ITSA framework as a guiding tool to explore the social and technical interactions of systems in a complex environment. The framework focuses on the work environment, infrastructure, EHR as designed, and EHR as used (Harrison et al., 2007). The study's findings related to the participants' views of how the external and internal environment plays an integral role in determining adoption and implementation needs. Based on the responses, the design of the system expands the need to coordinate the workflow with EHR implementation in the specific setting.

The participants identified a need for effective training and for standardization in the implementation approach of EHR systems. The participants also mentioned that their expectations of EHR systems did not match the reality of the system's performance. Due to the shelter infrastructure and electricity needs, successful implementation of EHR systems requires a robust information technology infrastructure to prevent workarounds. The end users of the system needed to be engaged in the planning stages at the beginning of the process. The IOM Report supported the use of EHRs over 20 years ago to improve quality, safety, and efficiency in healthcare (Romano & Stafford, 2011). Over the years, the increased interest to move to a climate where technology boosts innovation and progression has met challenges in the healthcare setting. Transforming healthcare into the technology era requires more methodical and strategic planning. The participants'

viewpoints were mixed regarding the usefulness of an EHR system in the disaster setting. Although there were positive benefits with EHR utilization, the majority of the participants felt not having an EHR did not influence the patient outcomes.

The positive effects of improved patient outcomes and cost implications might not be noticed early after implementation but possibly long-term gains. EHR systems could be beneficial in active surveillance of illnesses and injuries can assist public health with gathering data for a rapid response. During a disaster, communication can be difficult. Therefore, communication can be enhanced or impeded with EHR systems leading to unintended consequences. Merely adopting EHR systems will not lead to improving patient outcomes and efficiency, the system has to be used appropriately to integrate the meaningful use of the system and the meaningful benefits (Classen & Bates, 2011). Consequently, this study furthers the findings of Zadvinskis, Chipps, and Yen (2014) that perceptions can influence their acceptance of technology.

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Appendix A: Recruitment Purpose Letter

Recruitment Purpose Letter

To all public health providers, you are cordially invited to participate in a research study designed to explore the perceptions of public health providers in the usefulness of electronic health records in a disaster setting. Please read the information contained in this letter before agreeing to be included in the study. You will also receive a screening questionnaire to complete. You may contact me with any questions or concerns.
The study is conducted by Sherhonda Harper, Doctoral Candidate at Walden University.

I am conducting a research project that seeks to explore the perceptions of public health providers regarding the use of electronic health records in a disaster setting. I am basing my research on public health providers who have worked in a disaster shelter as a healthcare provider. If you agree to participate, you will be asked to complete the screening questionnaire and also to participate in an interview that will last approximately 45-60 minutes at the place most convenient to you.

All information will be confidential. No identifying information will be utilized in the study. The information you provide will be used in this study to be included in my dissertation for publication. A 1-2 page summary report with the results of the study will be offered to you at the end of the study via email.

You may choose not to participate in this study. If you decide to participate, you may withdraw from this study at any time. Your decision not to participate or withdraw will not result in any losses to you.

If you are interested, please complete the screening questionnaire and the consent form. You can email the forms directly to me. I look forward to hearing from you.

Sincerely,

Sherhonda Harper, RN
Doctoral Candidate, Walden University

Appendix B: Screening Questionnaire

Screening Questionnaire

Do you have experience working in a disaster shelter setting?	YES	NO
Are you a physician?	YES	NO
Are you a nurse?	YES	NO

Appendix C: Interview Protocol

Interview Protocol

Time of Interview:

Date:

Place:

Interviewer:

Interviewee:

Participant Number Assigned:

Job Position Title/Specialty:

Number of Years You Worked in Public Health:

Number of Times You Worked in a Disaster Shelter as a Healthcare Provider:

Opening:
I would like to thank you for volunteering to participate in this interview. The purpose of this study is to explore your perceptions on whether or not electronic health records (EHR) are useful in this type of setting. I will ask you a series of questions related to your experiences working in a disaster shelter to determine if there is a need for electronic health records.

All information from this interview is confidential. Although I am documenting your name on this form, I will assign you a participant number for future reference. This interview session will last approximately 45 minutes to 1 hour. If at any time during this interview session you feel uncomfortable or you choose not to answer a question, you may withdraw or decline to answer any questions. Do you have any objections to the interview session being recorded to ensure quality data collection? Please let me know if you have any questions or concerns before we start.

Questions:

1) Let's begin by talking about your experience working in a disaster shelter?

2) Can you talk to me about your previous experiences?

3) Describe your typical day working as a provider at the shelter.

4) What were the biggest challenges you experienced working in the disaster shelter?

5) What are your thoughts on the current debate about the adoption and implementation of electronic health records?

6) What is your view on electronic health records and have you utilized an electronic health record system before?

    a. If you have utilized an EHR system before, what are some of the challenges you faced using it?

    b. If you have utilized an EHR system before, what are some of the benefits?

    c. What, if any, problems you encountered with the design of the EHR system?

    d. What do you feel would be the differences in your previous work setting compared to the disaster work setting?

7) How were you able to address the medical needs of the individuals within the shelters?

8) What kind of concerns, if any, do you have with an electronic health record system within a shelter?

9) What are your perceptions of how implementation of an EHR system will impact providing care in a disaster shelter?

10) What are your perceptions of how not implementing an EHR system will impact providing care in a disaster shelter?

11) Are you concerned that adding an electronic health record system into your daily workflow could create any barriers or challenges?

    a. If yes, what are the barriers you foresee?

    b. If no, how do you think it will improve healthcare delivery within the shelter?

12) When you consider the physical layout of the shelter you worked in, do you perceive any barriers with EHR implementation (portable computer versus stationary work stations versus laptops)?

13) What are your perceptions related to how communications within the shelter may be improved or altered?

14) What organizational policies do you perceive will be need to be implemented if EHRs are useful?

15) Do you have any comments or questions you would like to add?

This concludes our interview session. I would like to thank you for your participation in this study and your time.

Appendix D: Observation Protocol

Exploring Public Health Providers' Perceptions of Electronic Health Records in a Disaster
Observation Protocol

Date:

Time Observation Began:

Location:

Observer:

Atmosphere:

Time Observation Ended:

Describe the setting:

Describe any gestures:

Describe interactions during the observation:

Describe nonverbal communication:

Self-evaluation: