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Describing Healthcare Service Delivery in a Ryan White Funded HIV Clinic: A Bayesian Mixed Method Case Study

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ACCEPTANCE

This dissertation, DESCRIBING HEALTHCARE SERVICE DELIVERY IN A RYAN

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DESCRIBING HEALTHCARE SERVICE DELIVERY IN A
RYAN WHITE PROGRAM FUNDED HIV CLINIC:
A BAYESIAN MIXED-METHODS CASE STUDY

by

Stephanie N. Beane

Under the Direction of William L. Curlette

ABSTRACT

This dissertation describes health care delivery in a Ryan White Program (RWP) HIV clinic, with a focus on medical home care, using the Bayesian Case Study Method (BCSM). The RWP funds medical care for uninsured HIV patients and Pappas and colleagues (2014) suggested enhanced HIV care build upon medical home models of care rooted in the RWP. However, little research describes how RWP clinics operate as medical homes.

This study developed the BCSM to describe medical home care at a RWP clinic. The BCSM combines a case study framework with Bayesian statistics for a novel approach to mixed method, descriptive studies. Roberts (2002) and Voils (2009) used mixed-method Bayesian approaches and this dissertation contributes to this work. For this study, clinic staff and patients participated in interviews and surveys. I used Bayes' Theorem to combine interview data, by use of subjective priors, with survey data to produce Bayesian posterior means that indicate the extent to which medical home care was provided. Subjective priors facilitate the inclusion of valuable stakeholder belief in posteriors. Using the BCSM, posterior means succinctly describe qualitative and quantitative data, in a way other methods of mixing data do not, which is useful for decision makers.

Posterior means indicated that coordinated, comprehensive, and ongoing care was provided at the clinic; however, accessible care means were lower reflecting an area in need of improvement. Interview data collected for subjective priors captured detailed service delivery descriptions. For example, interview data described how medical and support services were coordinated and highlighted the role of social determinants of health (SDH). Namely, coordinated and comprehensive services that addressed SDH, such as access to housing, food, and transportation, were necessary for patients to focus on their HIV and utilize healthcare. This case study addressed a gap in the literature regarding descriptions of how RWP clinics provide medical home care. For domains with high posterior means, the associated interview data can be used to plan HIV care in non-RWP settings. Future research should describe other RWP HIV medical homes so this information can be used to plan enhanced HIV care across the healthcare system.

DESCRIBING HEALTHCARE SERVICE DELIVERY IN A
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ABBREVIATIONS

ACA	Affordable Care Act
ACO	Accountable Care Organization
ADAP	AIDS Drug Assistance Program
AETC	AIDS Education Training Center
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
CARE	Comprehensive AIDS Resource Emergency
CHC	Community Health Center
ECP	Essential Community Provider
EIS	Early Intervention Services
FDL	Federal Poverty Level
FQHC	Federally Qualified Health Center
HIV	Human Immunodeficiency Disease (Unless specifically differentiated, HIV is inclusive of AIDS.)
MAI	Minority AIDS Initiative
NHAS	National HIV/AIDS Strategy
PCMH	Patient-Centered Medical Home
PLWH	People Living with HIV
QHP	Qualified Health Plan
RWP	Ryan White Program
SDH	Social Determinants of Health

CHAPTER 1

INTRODUCTION

The Affordable Care Act (ACA), enacted in 2010, was designed to protect consumers, reduce overall healthcare costs, and ensure comprehensive insurance coverage (Patient Protection and Affordable Care Act, 2010). This legislation aligns with the 2010 National HIV/AIDS Strategy (NHAS), which delineated the nation's plan to lower HIV incidence and provide more accessible care to those with the disease (White House Office of National AIDS Policy, 2010). Both the ACA and the NHAS emphasize medical home models of healthcare delivery that are associated with positive healthcare outcomes (Grumbach, Bodenheimer, & Grundy, 2010). Since 1990, the Ryan White Program (RWP) has been one of the largest sources of federal funding for HIV/AIDS care in the United States (Henry J. Kaiser Family Foundation, 2013). RWP clinics provide and coordinate a range of medical and support services for people living with HIV (PLWH).

In editorial and opinion pieces, several HIV/AIDS experts have asserted that RWP clinics have long emulated the medical home model (Chu & Selwyn, 2011; Saag, 2009). However, little existing research provides a detailed contextual analysis of how RWP clinics may operate as medical homes. As healthcare reform changes the mechanisms by which HIV/AIDS care is funded and delivered, it is imperative to better understand how RWP funded clinics function as medical homes so best practices may be preserved or replicated in other settings. Healthcare studies are well suited to case study design because examining complex systems requires flexible methods. Bayesian approaches formalize the integration of mixed method data. I coined the term the

Bayesian Case Study Method (BCSM) to describe the mixed-method approach I used to examine medical home care in a RWP clinic.

Need to Develop Bayesian Case Study Healthcare Research Techniques

This study addressed a need to develop and test the BCSM approach to healthcare service delivery research. Bayesian mixed-methods are not widely used and an examination of the literature revealed minimal discussion of this method by a small group of researchers who encouraged further development (Curlette, 2006; Roberts, Dixon-Woods, Fitzpatrick, Abrams, & Jones, 2002; Voils, Hasslebrad, Crandell, Chang, Lee, & Sandelowski, 2009). There has long been support for the integration of qualitative and quantitative evidence to describe and answer questions about complex systems, such as healthcare (Barbour, 1999). However, debates continue about how mixed methods should be applied in healthcare research.

Zang and Creswell (2013) systematically reviewed five years of mixed-method healthcare service research and noted that many studies failed to address critical research design aspects, such as why and how mixed-method procedures were selected to answer research questions, what specific procedures were used to collect and integrate the two types of data, how methods were linked, and the researcher's theoretical stance. Clearly, there is a need to formalize mixed-method healthcare research. This sentiment is echoed by Dixon-Woods, Fitzpatrick, and Roberts (2001) in an editorial that called for more systematic mixed-method research designs. Bayesian inference is one such solution to a systematized mixed-method approach.

Curlette (2006) outlined a Bayesian mixed-method approach to Individual Psychology research that integrated qualitative and quantitative data. Curlette's (2006)

solution proposed the use of Bayes' theorem to incorporate an expert's subjective probabilities concerning an event, the prior, with quantitative data to arrive at a posterior probability distribution. In addition to Curlette's (2006) work, two studies in the area of healthcare research employed Bayesian mixed-methods to conduct meta-analyses (Roberts et al., 2002; Voils et al., 2009). These studies differed in how the qualitative data were elicited and entered into Bayes's theorem. Dixon-Woods, Agarwal, Jones, Young, and Sutton (2005) challenged mixed-method Bayesians to further develop mechanisms for prior elicitation and to examine the utility of various qualitative methods. At the time of my literature review, Voils et al. (2009) and Roberts et al. (2002) were the only published studies that used Bayesian mixed methods. Two dissertations used Curlette's (2006) Bayesian mixed-method approach within a phenomenological framework (Bhagavati, 2009; Ogletree, 2009). My study built upon the limited research in this area by testing a previously unexplored case study application of the Bayesian mixed-method approach. Case studies are particularly useful for describing systems (Stake, 1995), and I collected data from patients and staff at a RWP clinic using interviews and surveys to develop and test the BCSM.

Need to Assess Medical Home Characteristics in RWP Clinics

This study addressed a need to assess the extent to which and how a large, RWP clinic in a metropolitan city center provides medical home care. The medical home is an approach for delivering healthcare services, especially primary care. Emphasis on the medical home model has gained attention over the past few years as evidenced by NHAS and the ACA; furthermore, the medical home is a standard of care recognized by certify-ing bodies such as the National Committee for Quality Assurance (NCQA) and the Joint

Commission (NQCA, n.d.; Joint Commission, 2012). The NHAS designated the RWP as an ideal model of medical home care for PLWH and called for the program's best practices to be shared with providers in other settings, such as Community Health Centers (CHCs). Although the NHAS highlighted and supported the RWP, the strategy failed to specify how the RWP will integrate into healthcare reform as more patients become insured (The White House Office of National AIDS Policy, 2015). Despite the spotlight on the RWP and the medical home, very limited research delineates if and how RW clinics uniquely provide medical home care for PLWH. Most literature specific to the RWP and the medical home is editorial in nature and based on medical providers' informal observations over the years (Chu & Selwyn, 2011; Gallant et al., 2011; Saag, 2009). Other studies have been purely exploratory and included interviews with RWP medical directors to examine interpretations of the medical home in large, urban HIV clinics (e.g., Beane, Culyba, DeMayo, & Armstrong, 2013).

Some non-medical-home research has examined characteristics of the model in RWP settings. Valverde et al. (2004) surveyed RWP and non-RWP clinics about specific services offered to patients. Results showed that RWP clinics offered more service types, an indication of the medical home principle called care comprehensiveness, than their non-RWP counterparts. A more recent study found that RWP clinics were more likely to provide support services such as case management and substance abuse counseling than non-RWP clinics (Weiser, Beer, Frazier, Patel, Dempsey, Hauck, & Skarbinski, 2015). Furthermore, this study also found that low income patients were more likely to achieve viral suppression in RWP funded clinics than in non-RWP clinics. These data suggested RWP clinics are able to provide comprehensive care with positive health outcomes;

however, these studies were limited to examination of one of the four chief medical home principles.

The aforementioned studies are illuminating but inadequate to richly describe if and how an urban RWP clinic may provide medical home care on a day-to-day basis. Therefore focused research was needed to close this knowledge gap.

Ryan White CARE Act. Each year, approximately half a million PLWH in the United States, with eligible incomes, receive medical care under the Ryan White Treatment Extension Act of 2009. The RWP provides medical care and support services for PLWH who are completely uninsured or who have inadequate insurance coverage and fills coverage gaps left by private insurance, Medicaid, and Medicare (Henry J. Kaiser Family Foundation, 2013). For those PLWH who are completely uninsured, RWP services may be their only avenue to healthcare. Today, the RWP funds comprehensive medical services, such as primary and specialty HIV care and a laundry list of psychosocial support services. RWP clinics and providers operate across the United States and for three decades have served populations that otherwise would not have access to healthcare.

Medical Home Model of Healthcare Service Delivery. The Association of American Medical Colleges (2008) described medical homes as continuously arranging exhaustive patient services with a primary care provider acting as the first line of contact for patient-oriented care. A medical home, also called a patient-centered or primary care medical home, arranges primary and specialty care for acute and chronic conditions across the spectrum of health needs, including psychosocial services, with a focus on communication between providers. Medical homes have been found to have lower

operating costs, improved patient health outcomes, and less staff burnout than control sites (Grumbach et al., 2010; Reid, Coleman, Johnson, Fishman, Hsu, Soman, Trescott, Erikson, & Larson, 2010). The four medical home principles my study addressed were first contact care, ongoing care, coordinated care, and comprehensive care.

Michael Saag (2009), the director of the University of Alabama's Center for AIDS Research, described how he observed the wide array of services provided or coordinated by RWP clinics evolve into a medical home model of care. Although the RWP was not conceptualized on the medical home, many HIV/AIDS clinical experts assert that the increasing medical and psychosocial needs of PLWH and a lack of afford-able healthcare resulted in what we now recognize as a medical home in RWP care settings (Chu & Selwyn 2011; Saag, 2009).

Patient Protection and Affordable Care Act and the National HIV/AIDS Strategy. The 2010 Patient Protection and Affordable Care Act put into motion extensive healthcare overhaul for the United States, having an impact on how the NHAS goals to reduce HIV incidence and increase access to care are met. The ACA safeguards consumers, strives to reduce healthcare costs for individuals and the nation, and increases routes to affordable insurance for groups with pre-existing conditions that were pre-viously excluded (The White House, 2010). Healthcare reform holds promise for lower-ing HIV incidence and improving health outcomes for PLWH by making healthcare for those living with the disease more attainable. The RWP is a payer of last resort, and PLWH newly eligible for Medicaid or insurance subsidies under the ACA will no longer qualify for RWP services that are covered under their insurance plans (Policy Clarifi-cation Notice, 2010). Unfortunately, for some PLWH, shifts in healthcare plans and

provider networks interrupt continuous care with their existing RWP providers, who are experienced in HIV management. Some authors have expressed concern about how these shifts may affect the quality of care for PLWH (Gallant et al., 2011).

The ACA supports medical home models of healthcare in several ways. The ACA funds Medicaid Health Homes, provides 100% reimbursements for organizations coordinating comprehensive care, disburses grants to tribal organization medical homes, and funds medical home demonstration projects (Patient Protection and Affordable Care Act, 2010; The Henry J. Kaiser Family Foundation, 2011; Wisconsin Department of Health Services, 2013). The California HIV/AIDS Research Program also funded five HIV medical home demonstration projects for a 3-year period (California HIV/AIDS Policy Research Centers, 2011). These projects have demonstrated outcomes such as improved viral suppression among patients at one site (California HIV/AIDS Research Program, 2015). However, demonstration projects are limited to the evaluation of HIV clinics that are specifically designed to implement medical home characteristics and are closely monitored. In essence, demonstration projects may not be representative of the typical RWP clinic.

Research Questions

I used the BCSM to describe if and how a RWP HIV clinic in the Southeastern United States demonstrates care that aligns with the medical home model. Data were collected from patients and staff using surveys and interviews. This study described four medical home principles or domains: first contact care, ongoing care, coordinated care, and comprehensive care. I addressed the following questions:

1. How can researchers use the BCSM to integrate qualitative and quantitative case study data? What are the research design considerations, strengths, and weaknesses of the BCSM approach to healthcare service delivery research?

2. How and to what extent does the clinic provide medical home care according to patient and staff interviews? What prior mean scores are assigned to each medical home domain for patient and staff groups based on interview data?

3. What are the Johns Hopkins Primary Care Assessment Tool (PCAT) mean scores for each medical home domain for patient and staff groups?

4. What are patient and staff posterior means for each medical home domain? How do prior means influence posterior means? How do patient posterior means compare to staff posterior means?

Methodology Overview

I developed and used the BCSM to describe if and how a RWP-funded clinic delivers medical home care. My unit of analysis, or the case, was a RWP-funded HIV clinic in a large city in the southeastern United States. The clinic was established in the mid-1980s, which was early in the HIV epidemic. The clinic is one of the nation's largest providers of HIV care, lending aid to over 5,000 PLWH and affected families.

I selected a single case study design for three reasons. First, a case study is appropriate because there are no clear boundaries between healthcare delivery at the clinic and the clinic itself, which is a bounded system (Yin, 2009). Second and third, I chose to examine this clinic because of its accessibility and similarity to other urban RWP clinics with large patient populations as found by Beane et al. (2013).

In the first phase of my study, I estimated Bayesian priors for four medical home constructs, three of which are divided into two subdomains, for a total of 7 domains. Priors were estimated separately for patient and staff samples. The sources of evidence collected for estimating priors were interviews with patients and staff, such as clinicians and support service providers. During these interviews, staffs were asked to describe clinical and psychosocial service planning, delivery, and coordination and to reflect upon experiences providing services at the clinic. Likewise, patients were asked to describe experiences receiving services at the clinic. I assigned priors based on the information provided during interviews (Smith, 2010).

For the second phase of my study, I collected Primary Care Assessment Tool (PCAT) surveys from 20 patients and used the Provider version of the PCAT to survey 16 staff. Shi, Starfield, and Xu (2001) examined the PCAT, and found that its domains of first contact access, ongoing, coordinated, and comprehensive care align with the major tenets of the medical home model.

I used Bayes's Theorem (Bolstad, 2011) to combine priors I estimated for each medical home domain with PCAT data from matching domains to obtain seven posterior distributions for patients and six posterior distributions for staff (Curlette, 2006). My study combined qualitative and quantitative data, which provided more information than one data source or method alone. Furthermore, data from both patients and providers provided a comprehensive description of the case. Interview data were analyzed and summarized to help explain survey results and to assess how well results from interview data supported or contrasted with survey results.

Research Goals

This research had three main goals. The first 2 goals focused on the fidelity of RWP clinic service delivery according to the medical home model. The first goal was to determine if and to what degree the clinic demonstrated medical home principles. I examined summated PCAT Likert-scale scores and posterior distributions from patients and staff for each medical home domain to address this goal. The second goal was to describe how services were delivered by analyzing data from interviews, which informed findings from goal one. The third goal was to use Bayesian statistics to combine qualitative and quantitative case study data to develop a new mixed methods approach, the BCSM, which had not previously been tested.

Significance of the Study

Significance of the Medical Home in RWP settings. It was critical to document if and how an exemplar RWP clinic delivered services in accordance with the medical home model because of the promising individual and population level benefits found in medical home settings. Furthermore, non-RWP providers that assume care for PLWH will benefit from information about these practices. For example, primary care medical homes have shown increased patient involvement in care and reduced costs because of fewer morbidities and emergency hospitalizations (Grumbach et al., 2010; Ried, Fishman, Yu, Ross, Tufano, Soman, & Larson, 2009). PLWH who are engaged in care are more often prescribed and adherent to antiretroviral therapy (ART) regimens, less likely to transmit HIV, and have longer life spans (Antiretroviral Therapy Cohort Collaboration, 2008; Jia, Ruan, Li, Xie, Li, Wang, Chen, & Shao, 2012; Montaner et al., 2010; Rebolledo, Kourbatova, Rothenberg, & Del Rio, 2011). Even with the RWP, the

HIV/AIDS care continuum for the United States shows that only one third of those diagnosed with HIV are retained in care and even fewer are prescribed ART (Gardner, McLees, Steiner, del Rio, & Burman, 2011). Therefore, it is imperative that healthcare reform preserves the best aspects of RWP HIV care that align with recognized standards such as the medical home model and that have been shown to be superior to non-RWP HIV care (HIV Medicine Association of the Infectious Diseases Society of America and the RW Medical Providers Coalition, 2011; Sullivan, Denniston, Mokotoff, Buskin, Broyles, & McNaghten, 2008).

HIV/AIDS treatment is a highly specialized field and there are over 30 different types of ART available for rapidly evolving, complex multidrug regimens (DHHS, 2013). RWP providers are typically more experienced in HIV management than non-RWP providers because they specialize and only treat PLWH (Volberding, 2012). RWP providers and clinics have a long history serving the complex HIV specialty care, primary care, and psychosocial needs of PLWH (Henry J. Kaiser Family Foundation, 2013).

Poor management of HIV, a highly communicable disease, has serious public health implications, especially in communities disproportionately affected by HIV, such as African American men and women, men seeking men, and impoverished populations (AIDSVu, 2013; Prejean, Tang, & Hall, 2013). Chu and Selwyn (2011) stated that research on effective HIV care models is needed to retain and replicate these practices in other settings as healthcare reform is implemented:

> Very little has been published about the various current models of (HIV) care including their development and effectiveness. One of the more well-recognized models is the HIV/AIDS-dedicated treatment center, many of which are supported through the Ryan White CARE Act. (p. 561)

Healthcare reform increases access to insurance coverage for PLWH and reflects a more equitable distribution of healthcare. However, an unexpected consequence of healthcare reform implementation is that some PLWH acquire private insurance and their RWP provider is not covered under the insurance plan. Providers covered under private insurance plans may include private practice and CHC clinicians inexperienced in HIV treatment. For this reason, Hampton (2011) explained that insuring more PLWH may reduce the need for the RWP. This issue is troubled by research that has found inferior HIV specialty care in non-RWP settings as compared to RWP settings (Sullivan et al. 2008).

The HIV Medicine Association of the Infectious Diseases Society of America and the Ryan White Medical Providers Coalition (2011) described crucial elements of HIV/AIDS care that healthcare reform should maintain; these practices closely aligned with RWP and Veteran's Administration models. The coalition specifically mentioned coordinated specialty HIV treatment, primary care, and support services provided by community-based organizations (Gallant et al., 2011). These characteristics match the medical home model, and this seminal article highlighted the need to replicate or extend upon the RWP model to preserve the current quality of care. My study provided a close look at a RWP clinic and described how care is delivered and to what degree it aligned with medical home model. Furthermore, data from my study provided information that can be used in response to the NHAS's call for the RWP to share best practices as more diverse providers manage HIV (White House Office of National AIDS Policy, 2015).

Methodological significance. The methodological contributions of my study are significant in that I expanded upon the few applications of Bayesian mixed-method

research in the current literature. My research was unique because I used prior elicitation and Bayesian inference to integrate qualitative and quantitative case study data to develop the BCSM and answer research questions. While mixed-method approaches to healthcare service delivery research are more accepted and valued than ever, continued debates about how to integrate data from different sources called for the development of more formal methods (Barbour, 1999; Dixon-Woods et al., 2001; Zang & Creswell, 2013). Existing mixed-method research in the healthcare field has been criticized for haphazard and poorly described methods. Specifically, Zang and Creswell (2013) reported that many publications vaguely described data collection and analysis procedures and failed to specify why the selected methods best answer the research questions (Zang & Creswell, 2013).

This study helps overcome these issues because I outline in detail the BCSM approach to research design, data collection, and analysis which can then be replicated by others. Specifically, my work builds upon applications of Bayesian mixed methods used in studies by Voils et al. (2009) and Roberts et al. (2002) to test a research design described by Curlette (2006). The aforementioned studies were Bayesian mixed-method meta-analyses; however, they were an appropriate benchmark for my study because these authors faced many of same decisions any Bayesian encounters in regard to qualitative data estimation, selection of distributional families, choice of prior, and placement of data types in the Bayesian model. To build upon previous Bayesian work, my research was guided by these authors' recommendations and implications for future research.

For example, Dixon-Woods et al. (2005) appealed to Bayesians to expand mixed-method studies to various modes of qualitative synthesis and at the time of this

dissertation there were no documented case studies that employed Bayesian mixed methods. Voils et al. (2009) expressed that it was difficult to create estimates for qualitative data and recommended the development of a method to guide this process. I used interviews to elicit priors and demonstrated a process for estimating priors based on non-numeric data. Roberts et al. (2002) urged mixed-method Bayesians to include a separate narrative summary of the qualitative data to ensure important details are not lost and to explain posterior estimates. My analysis includes a qualitative summary to help explain the posteriors. Finally, Roberts et al. (2002) encouraged researchers to elicit priors from lay persons, instead of just experts, when lay knowledge is important. Because all types of staff that work with patients have knowledge of healthcare service delivery in that setting, I interviewed a variety of staff types, including those who may not be familiar with the medical home concept but still had insight on service delivery at the clinic. Furthermore, I interviewed patients about experiences receiving healthcare services. I then used these interview data to estimate staff and patient prior estimates.

Summary

In this chapter I provided an introduction to the ACA and the NHAS and how each influences HIV care in the United States. I also presented background information on the RWP and the medical home model of care. I explained why a case study of the medical home in a representative RWP setting is useful. I also presented shortcomings of mixed method healthcare service delivery research design. Last, I provided a broad overview of my approach to developing the BCSM.

CHAPTER 2

Review of the Literature

In this chapter, I review the history and current state of the Ryan White Program in the context of healthcare reform. More specifically, I outline the history and role of the RWP, its relationship to the medical home, early models of healthcare delivery that led to the medical home, and the medical home in RWP HIV care settings. In the second half of this chapter I provide an account of mixed method procedures and data analysis used in healthcare service delivery research. I also describe the advantages of Bayesian statistics for combining quantitative and qualitative data. Additionally, I detail the role of subjective probability for eliciting priors in a case study of a RWP clinic.

HIV/AIDS Care, the Healthcare Landscape, and Medical Homes

The Ryan White Program. Since the beginning of the epidemic in 1987, over 630,000 people with AIDS have died in the United States (CDC, 2015). Today, there are more than one million PLWH in the United States with approximately 50,000 new infections per year (CDC, 2015). The RWP provides care for PLWH with eligible incomes who are without insurance or underinsured. For PLWH who adhere to medication regimens, ART now doubles the lifespan of those with the disease as compared to early in the epidemic (HIV-CAUSAL Collaboration, 2010). In 2005, the Antiretroviral Therapy Cohort Collaboration (2008) found that patients on ART lived an average of 49 years as compared to 36 years in 1996 when medication regimens were limited.

As HIV evolved from a terminal to a chronic disease, the RWP expanded the services it provided to meet the changing needs of PLWH. PLWH now have age related comorbidities, such as diabetes, heart disease, and chronic pain, which complicate HIV

management (Balderson, Grothaus, Harrison, McCoy, Mahoney, & Catz, 2012). Primary care and HIV/AIDS care are covered medical services under the RWP as are other specialties: oral health, obstetrics and gynecology, hospice, antiretroviral medication, mental health and substance abuse treatment, and medical case management. RWP support services include transportation to medical visits, linguistic services such as translators, housing, legal services, child care, and non-medical case management to coordinate care and services for patients (U.S. Department of Health Resources and Services Administration, 2013).

Over time, the RWP divided into five different subgroups, Parts A-D and F, and each part directs categories of services for specific needs and populations (Henry J. Kaiser Family Foundation, 2013). Part A funds medical care and support services for eligible metropolitan areas (EMAs) which are designated based on the number of AIDS, not HIV, cases in that area. HIV is the virus that causes AIDS and not all people with HIV have AIDS; AIDS is characterized by a compromised immune system and opportunistic infections such as tuberculosis and pneumonia (Centers for Disease Control and Prevention, n.d.). Planning councils decide how to allocate funding within EMAs and include PLWH as voting members.

Part B funds AIDS drug assistance programs (ADAP) that distribute ART and disburses money to state entities such as health departments to provide HIV care. Part C supports early intervention service (EIS) professionals who administer HIV tests and provide counseling for high risk populations such as injection or other drug users, sex workers, and persons with mental or behavioral health conditions. Community and faith-based organizations are funded by Part D to provide services for children and women

with or affected by HIV. The RWP does not have a part E. Part F funds AIDS Education and Training Centers (AETCs) to provide continuing education and training for clinicians and support service providers that service PLWH. The Minority AIDS Initiative (MAI) is subfunded under each part of the RWP, and it focuses on African American PLWH (Henry J. Kaiser Family Foundation, 2013).

Many federally qualified health centers (FQHCs), government, state, and county agencies such as health departments, receive RWP funding to provide care for patients with HIV. In addition to PLWH, these agencies care for a larger population of non-HIV infected patients. Other clinics exclusively provide medical care for PLWH and operate as HIV subclinics of hospitals, community health centers, or health departments. These HIV clinics see a higher volume of PLWH and may provide a variety of support services such as mental health and substance abuse counseling, housing, nutrition, and transportation services. Although HIV clinics may accept Medicare, Medicaid, and private insurance they are referred to as RWP clinics because the RWP funds services for non-insured patients, which is typically the largest patient population, and fills coverage gaps for those with insurance (Henry J. Kaiser Family Foundation, 2013).

The RWP plays a large role in the HIV epidemic in the United States because access to and utilization of medical care and ART lowers patients' viral loads, which is a measure of the amount of virus in the blood. It also decreases the degree to which PLWH are infectious to others and decreases the community viral load, which is the aggregate viral load for members of a community (Jia et al., 2012; Miller, Powers, Smith, & Cohen, 2013; Montane et al., 2010; Rebolledo, et al., 2011).

Healthcare reform and the National HIV/AIDS Strategy. The Affordable Care Act (ACA), enacted in 2010, was designed to protect consumers, to reduce overall healthcare costs, and to ensure comprehensive insurance coverage (Patient Protection and Affordable Care Act, 2010). This legislation aligns with the 2010 National HIV/AIDS Strategy (NHAS) that delineated the nation's plan to lower HIV incidence and provide more accessible care to those with the disease (White House Office of National AIDS Policy, 2015). Both the ACA and the NHAS emphasize medical home models of healthcare delivery that are associated with positive healthcare outcomes (Grumbach et al., 2010).

The Affordable Care Act. The long term effects of the ACA on the RWP are yet unknown; however, there are several ways the ACA directly affected PLWH. The ACA increased insurance accessibility for PLWH by removing pre-existing condition exclusions and annual and lifetime limits on essential benefits, two practices that were common in the insurance industry until recently (Centers for Disease Control and Prevention, 2013). Because many PLWH were denied coverage altogether or were unable to afford expensive premiums, the RWP was the only way they could access healthcare.

One of the most notable facets of the ACA is Medicaid expansion. In adopting states, Medicaid now covers more individuals with incomes below 133% of the federal poverty level (FPL) than ever before (Centers for Disease Control and Prevention, 2013). Regrettably, not all states have expanded Medicaid and this overwhelmingly includes Southeastern states with some of the highest rates of HIV in the nation (AIDSVu, 2013; Center on Budget and Policy Priorities, 2013). Prior to the ACA, many PLWH without dependents were ineligible for Medicaid unless they had an AIDS diagnosis or other

disability qualification; therefore, those with HIV, not AIDS, had to rely on other sources of healthcare such as the RWP.

In 2013, the Affordable Care Act closed the Medicaid donut hole or the large out-of-pocket payments beneficiaries had to pay for prescription drugs. Prior to 2013, Medicaid Part D required a $320 out-of-pocket deductible for prescription drugs and once that was met, plan members paid coinsurance. However, Part D's combined spending limit maxed out at $2,930 at which point beneficiaries were responsible for the full cost of drugs until they met the next spending limit of $4,700. This gap in coverage from $2,930 to $4,700 was the donut hole where beneficiaries paid $1,770 out-of-pocket for the full price of prescriptions (Q1 Group LLC, n.d.).

Paying the full cost of expensive HIV medications presented a significant financial burden for many PLWH. The ACA alleviated that burden by shrinking the Medicaid donut hole. As of 2013, Medicaid beneficiaries pay 47.5% of the cost of brand name drugs and 79% for generic drugs while in the donut hole as compared to earlier years when beneficiaries paid 100% of the cost of drugs (Centers for Medicaid and Medicaid Services, 2013). Beginning in 2013, the length of time in the donut hole was shortened and more beneficiaries' costs now count towards the spending limit needed to move out of the coverage gap (Centers for Medicaid and Medicaid Services, 2013). These include out-of-pocket prescription costs, premiums, copayments, and ADAP contributions for ART (Centers for Disease Control and Prevention, 2013).

In addition to Medicaid expansion, households with incomes between 100% and 400% of the FPL now have more affordable access to private health insurance through the Health Insurance Marketplace. Income based, tiered tax credits are paid directly to

insurers that participate in the marketplace to lower out-of-pocket costs for individuals and households (National Alliance of State & Territorial AIDS Directors, 2013). The marketplace is regulated, and it provides chronically ill and low income populations more affordable paths to care than previously available. Unfortunately, in states that chose not to expand Medicaid, only individuals with incomes between 100% and 400% of FPL will benefit from care reform through the Health Insurance Marketplace. Many of the poorest individuals (with incomes less than 100% of the FPL) continue to lack access to affordable healthcare.

For some PLWH, shifts in healthcare plans from the RWP to Medicaid or private insurance may interrupt continuous care with their provider. RWP clinics must be selected as essential community providers (ECPs) by a qualified health plan (QHP) in the Health Insurance Marketplace or by Medicaid to be considered in-network. ECPs specifically care for low-income patients. RWP clinics that did not become ECPs are not covered by those insurance plans. There are safeguards in place to reduce the extent to which specialty care providers, such as HIV clinicians, are excluded from the marketplace. For example, QHPs are required to include at least 20% of an area's ECPs generally and a minimum of one HIV/AIDS ECP (Centers for Medicaid and Medicare Services, 2013). Unfortunately, this minimum is far lower than the number of HIV providers in many urban areas; therefore, some long-term providers for PLWH are not included. Furthermore, not all services traditionally provided to RWP recipients are covered under QHPs, thus reducing care comprehensiveness. However, with continued funding, the RWP program can fill gaps in care left by Medicaid and private insurers.

In addition to increased access to affordable care in most states, the ACA prioritized reimbursement for PCMH models of healthcare and still carries implications for future HIV/AIDS care funding. The Patient-Centered Primary Care Collaborative outlined sections of the ACA that emphasized primary care and medical homes for patients with chronic conditions, such as HIV/AIDS. One area addressed the Medicaid Health Home Option. States may apply for this option, and it is reserved for patients with two chronic conditions. This option was backed by federal funding for approved states, which was most intensive in the start-up phase and the first 2 years of implementation. Wisconsin was approved for this option and received $500,000 to plan a health home. The funding was matched at a 90% rate for the first 2 years of practice (The Henry J. Kaiser Family Foundation, 2011; Wisconsin Department of Health Services, 2013).

Another relevant section of the ACA included higher reimbursement rates for organizations that coordinate comprehensive care, such as Accountable Care Organizations (ACOs; Patient Protection and Affordable Care Act, 2010). Under the ACA, ACOs are partly reimbursed according to care quality and focus on patient provider relationships and care coordination, which are main tenets of the medical home. Additionally, as an ACA provision, primary care providers are fully reimbursed; primary care is at the core of the medical home model. Grants are also available for tribal organizations and state-based systems of care operating as medical homes. These grants distributed payments based on patient's projected healthcare needs for the year and associated costs (Establishing Community Health Teams, 2010). With these funding and reimbursement structures in place, the ACA has clearly prioritized the medical home model of care.

The National HIV/AIDS Strategy. The NHAS recognized both the RWP and the

ACA as crucial to the reduction of health disparities for PLWH because even as

insurance becomes more accessible, some PLWH remain excluded from Medicare or

insurance subsidies. For this reason, the NHAS set a goal to increase the number of

PLWH enrolled and retained in the RWP and recognized that the RWP has adopted

medical home practices (The White House Office of National AIDS Policy, 2015).

> The concept of a medical home is a model for the provision of coordinat-
> ed, person-centered care for individuals with chronic or prolonged ill-
> nesses requiring regular medical monitoring, care management, and
> treatment. The Ryan White HIV/AIDS Program has supported the
> development of medical homes for people living with HIV and has
> experience to share, which can be valuable to other providers including
> community health centers and private physicians in their provision of HIV
> care. (p. 27)

While the NHAS recognized the RWP, it also supported HIV management in

non-HIV settings that provide primary care. For example, the ACA increased funding to

CHCs, and the NHAS emphasized CHCs as a key setting where PLWH should seek care.

The NHAS also called to diversify settings where HIV care is provided (Hampton, 2011;

White House Office of National AIDS Policy, 2015). Drastically cutting the cost of

healthcare was a primary goal of the ACA (Patient Protection and Affordable Care Act,

2010) and shifting HIV management to primary care providers is thought to reduce the

cost of HIV care. However, Stange and Ferrer (2009) warned against shifting HIV care to

non-disease-expert primary care providers in an effort to save healthcare dollars.

> The paradox is that compared with specialty care or systems dominated by
> specialty care, primary care is associated with the following: (1) apparent-
> ly poorer quality of care for individual diseases, yet (2) similar functional
> health status at lower cost for people with chronic disease, and (3) better
> quality, better health, greater equity, and lower cost for whole people and
> populations. (p. 295)

Reduced healthcare costs, increased access to care, and improved population health, all positive outcomes, may result in subpar HIV management if PLWH are cared for by providers with little HIV experience. Poor HIV treatment can have a large impact on society if HIV transmission and deaths increase. In light of this potenial, groups such as the HIV Health Care Access Group (2012) support both the ACA and continued funding of specialty programs like the RWP to ensure access to high quality care for everyone. The NHAS lauds the quality and necessity of RWP services, but it does not specify if the RWP model will continue to operate as it has or if it will be replicated in primary care settings.

Medical homes and the Ryan White Program. HIV experts have supported the NHAS's description of the RWP as providing medical homes for PLWH. Saag (2009) stated that the RWP community responded to the medical and psychosocial needs of PLWH as well as the growing complexity of HIV clinical management by implementing multidisciplinary teams willing to specialize in a complicated and stigmatized disease. This care infrastructure naturally evolved into a type of medical home that catered to the needs of PLWH (Saag, 2009). Chu and Selwyn (2011) echoed this sentiment, stating,

> At the height of the epidemic, such clinics—often hospital-based and/or academically affiliated—began to emerge, offering a range of HIV-focused services including medical, dental, nursing, and pharmacy care; mental health/substance use treatment; nutrition and social work services; and referrals to local case management and service organizations. (p. 561)

Others have suggested that enhanced HIV care across the healthcare system is dependent on building upon medical home models of care rooted in the RWP (Pappas et al., 2014). While the RWP has been described as a provider of medical homes for PLWH, little attention has been paid to technical definitions of the medical home and how the RWP has embodied this type of care service delivery. In light of healthcare reform and

expected changes to HIV care funding, a more detailed examination of how a RWP clinic may operate as a medical home is warranted.

The evolution of Healthcare Delivery Models. Current healthcare delivery models, such as the medical home, are expansions of the biomedical model introduced in the mid-nineteenth century. The biomedical model was grounded in objectivism; stressed the role of clinical disease management for observed phenomena; and focused on disease pathology, physiology, and biochemistry (Annandale, 1998). The biomedical model was the benchmark of care for over 100 years until Engel (1977) challenged reductionist biomedicine and argued in support of a more exhaustive medical model.

The biopsychosocial model resulted from Engel's (1977) resistance to the traditional medical model. The biopsychosocial model was grounded in the works of Brody (1973) and Weiss (1973), who declared general system science, or general system theory (GST), had practical applications for life, ethics, and medicine. Prior to the biopsychosocial model, medicine was compartmentalized and focused on individual symptoms and diseases. Von Bertalanffy (1950) fathered GST and hypothesized that system models, developed out of sciences such as biology and physics, are generalizable to nearly any system including social and organizational models. GST is based on four principles: wholeness or holism, open systems, homeostasis, and feedback (Von Bertallanfy, 1968).

Von Bertalanffy's (1968) GST claimed that systems are an integrated whole instead of the sum of isolated parts that function independently: System elements influence and rely upon one another for efficiency. For example, in regards to the human body as a system, mental health influences physical health and vice versa; therefore

healthcare systems should attend to both. Open systems are characterized as affecting and being affected by the outer environment because the boundary between system and environment is penetrable. Healthcare service delivery systems are affected by what patients and providers bring to the healthcare setting. For example, religion, stigma, health literacy, cultural capital, and socioeconomic status originate outside of the healthcare system and influence service delivery and receipt. Homeostasis pertains to the balance between system elements and is dependent upon feedback to make adjustments to system inputs and processes. For example, patient-provider and provider-provider communication is necessary to understand changes to patient health and needs so that appropriate adjustments may be made to medications, services, and care frequency.

GST continues to be a valued theoretical framework for healthcare research today. For example, GST was used by Yank (1995) and Janeka (2009) to map and examine healthcare service delivery in the United States. Recently, Anaf, Drummond, and Shepard (2007) provided a conceptual model to employ GST in qualitative healthcare research.

Engel (1977) developed the biopsychosocial model, born out of GST, which focused on the whole patient and is based on the interrelated nature of physical health, mental health, community, family, and culture. Engel posited that in order to care for patients effectively, physicians had to consider the biological features of disease in conjunction with patient's psychological and social circumstances. In his seminal article, "The Need for a New Medical Model: A Challenge for Biomedicine," Engel (1977) described a patient who presented with chest pain that was only explained when doctors examined the man's life circumstances in addition to his physical symptoms. The

biopsychosocial model was in stark contrast to healthcare notions that prevailed for over a century, and, as the new model gained momentum, more nuanced versions developed.

In the 1960's a medical home infrastructure was developed to provide comprehensive and coordinated care for chronically or severely ill children (Kilo & Wasson, 2010). These first medical homes were based on the biopsychosocial model and provided comprehensive and coordinated services for children that required frequent medical attention. In the 1970s, the North American Primary Care Research Group focused on medical decision-making, which was followed by a dearth of research on primary care in the 1980s. Healthcare delivery systems born out of the biospychosocial model all stress primary care. Haggerty, Burge, Levesque, Gass, Pineault, Beaulieu, and Santor (2007) elicited operational definitions of primary care from physicians. There were consistent descriptions of person and community-oriented care with straightforward access to a broad range of continuous services for patients. In the primary care setting acute and chronic conditions are treated. A primary care provider is a doctor, physician assistant, or nurse responsible for most of a patient's healthcare needs and who arranges specialty services beyond the clinician's area of expertise. For example, a primary care provider may manage diabetes but refer the patient to an oncologist for cancer treatment.

In the 1990s the chronic care model was cultivated with roots in the medical homes originally created for very ill young patients 30 years earlier (Kilo & Wasson, 2010). The chronic care model was implemented to manage chronic illness within the primary care system. Chronic conditions require frequent patient-provider interaction. Therefore, the chronic care model emphasized information systems, delivery design for coordinated services, and patient involvement in decision-making to provide care

efficiently (Bodenheimer, Wagner, & Grumbach, 2002). Wagner (2000) expressed that successful chronic care is dependent upon a team of collaborating providers with varied clinical and psychosocial skills that address the behavioral and physiological needs of patients. The chronic care model evolved into the medical home model that receives so much attention today (Bodenheimer et al., 2002).

  Medical homes. Current medical homes resemble and extend upon the chronic care model that focused on coordinated and comprehensive care in a primary care setting. Medical homes are built on a framework that incorporates the patient's psychosocial context into primary care and disease management. Medical homes also emphasize the patient's illness experience and the patient-provider relationship, and primary care providers serve as trusted guides within the healthcare system (Ford, 2004). The Association of American Medical Colleges (AAMC; 2008) outlined necessary components of a medical home: Medical homes provide continuous, comprehensive, and coordinated services with a primary care provider acting as the first point of contact for patients. For example, services for mental health, substance abuse, social services, and specialty care are accessible and coordinated out of the primary care site. In a medical home, the patient is an active decision-maker bearing as much weight as the clinician (Stewart, Brown, Weston, McWilliam, & Freeman, 2003). According to the AAMC, "Every person should have access to a medical home–a person who serves as a trusted advisor and provider supported by a coordinated team–with whom they have a continuous relationship" (2008, p. 2).

  Medical homes are in contrast to models in which patients independently navigate the healthcare system, which may lead to lack of communication between providers,

fragmented care, and poor utilization of available services. In addition to the AAMC, other highly recognized professional organizations such as the American Academy of Family Physicians, American Academy of Pediatrics, and American College of Physicians formally support the adoption of medical homes in clinical care practices (Arvantes, 2008).

The medical home has grown in popularity over the past decade. For example, Rosenthal (2008) conducted a database search and found over 200 references to the medical home. Also, a growing body of research has demonstrated medical home implementation outcomes associated with patient and provider satisfaction, care quality, and cost savings. For example, the Geisenger Health System experienced an overall savings of 7% upon transitioning to a medical home model (Paulus, Davis, & Steele, 2008).

Reid, Coleman, Johnson, Fishman, Hsu, Soman, Trescott, Erikson, and Larson (2010) examined the outcomes of a 2-year medical home implementation across clinics that were part of a group health cooperative. Five changes were made to care delivery at intervention clinics: visit preparation to discuss patient concerns and expectations, follow-up with patients after discharge, collaborative patient-provider care plans, and patient access to electronic medical records. Electronic medical records gave patients the ability to view lab results, visit summaries, and health risk appraisals. Patients also gained tools to become proactively engaged in the healthcare delivery process with collaborative care plans, peer-led health education groups, and behavior change programs. Last, systematic changes were made to care management in the form of daily targeted care team meetings and performance tracking (Reid et al., 2010).

At the end of two years, Reid et al. (2010) compared measures at the medical home and comparison clinics. Patients at both sites were surveyed using a standardized instrument and medical home patients reported significantly better care experiences and satisfaction. Providers at medical home clinics were found to report significantly less burnout and exhaustion after adjusting to the new system. Finally, the medical home model was found to result in 1.5 dollars saved for every dollar invested (Reid et. al, 2010).

Grumbach et al. (2010) examined 14 medical home projects with prospective evaluations that found cost savings and fewer emergency hospitalizations for patients. Over half of the evaluations compared medical homes to control sites. The medical homes reported a lower incidence of disease and illness as compared to the control clinics. This may be a result of the increased preventative screenings, better patient satisfaction, and shorter appointment-wait times also reported at these sites (Grumbach et al., 2010).

Medical homes and specialty care. The medical home model naturally integrates with the delivery of primary care because the provision of primary care is fundamental to the medical home model. However, the utility of the medical home is not limited to the primary care setting and specialty care medical homes have recently received attention. A specialty care medical home provides disease or condition specific care, primary care, and may provide or coordinate other services. Kirschner and Barr (2010) described the appropriateness of the specialty medical home.

> Indeed, some internal medicine subspecialists, such as pulmonologists and endocrinologists, might be well positioned to qualify their practices as medical homes because of their ongoing roles as principal physicians, that is, by providing first-line care for a patient's complex care needs

associated with a chronic condition while also meeting that patient's general health-care needs. (p. 202)

For instance, Alekeson, Frank, and Kratz (2010) outlined support for medical homes in psychiatric settings for patients with serious mental illness. Patients with severe mental conditions visit psychiatrists or other mental health specialists far more often than they visit primary care providers, such as family physicians. Additionally, mental health professionals are trained to work with psychiatric care patients, they are aware of the patient's unique circumstances, and, because of visit frequency, they have an established relationship with the patient. Therefore, mental health providers are often best suited to coordinate visits to primary care providers or other types of specialists and check-up on adherence to care plans (Alekson et al., 2010).

One of the most important components of effective primary care is visit consistency for preventative care, screenings, and management of acute and chronic conditions. Specialty medical homes have been developed to manage degenerative diseases, such as chronic pulmonary obstructive disease, and to deliver primary care simultaneously (Oritz & Fromer, 2011). This type of specialty medical home builds upon the chronic care model, is hypothesized to increase time between hospitalizations, and in turn may reduce the cost of care. In a specialty medical home, a patient's care team is comprised of both primary care providers and disease specialists. This care delivery design is cost effective because visits with expensive specialist physicians are reserved for the most complicated cases or when the disease progresses. Patients who are stabilized are cared for by advanced practice nurses or physician assistants who deliver primary care and have sufficient knowledge of the disease. In this model, the primary

care provider is integrated into the specialty care setting instead of the traditional model where specialty and primary care occur in separate settings.

Hollingsworth, Saint, Hayward, Rogers, Zang, and Miller (2011) advocated for the incorporation of primary care in the specialty setting and examined data from the 2007 National Ambulatory Medical Care Survey. The survey measured frequency of new and return visits to primary care or specialist physicians for seven chronic conditions. Across conditions, 29% to 63% of ambulatory visits were return visits to specialists. In light of these findings, the authors concluded that the delivery of primary care in some specialty settings can be an effective model because of repeated patient-provider contact (Hollingsworth et al., 2011).

Casalino, Rittenhouse, Gillies, and Shortell (2010) expressed concern for the future of specialty practice funding amid healthcare reform. These authors surveyed 373 specialty care practices and assessed the extent to which they provided primary care for patients. Only a small percentage of those surveyed provided primary care. Caslino et al. (2010) noted specialty providers may best serve as medical homes for patients with chronic conditions; however, it is not well understood how various specialty providers may adopt medical home models of care.

Medical homes and HIV care. HIV/AIDS treatment has vastly changed over the years because ART medications have become more effective, regimens have been simplified, and side effects have become more manageable (Wilkin, Shalev, Tieu, & Hammer, 2010). The first antiretroviral medication, Zidovudine, entered clinical trials in 1985 and today there are more than 30 drugs available (Federal Drug Administration, 2013). Chu and Selwin (2011) noted that pharmacological advances increased life

expectancies of PLWH, which underscored the importance of primary care delivery along with HIV management (Antiretroviral Therapy Cohort Collaboration, 2008). As more PLWH develop age-related conditions that are typically treated in a primary care setting, such as diabetes or high cholesterol, Chu and Selwyn (2011) recommended medical homes for PLWH that integrate primary and HIV specialty care at the same care site. HIV specialists at RWP funded clinics typically attend to the primary care needs of patients either themselves or in conjunction with other onsite providers. Advanced practice nurses and physician assistants with HIV management experience often care for the bulk of patients with HIV under the supervision of an attending HIV physician (Saag, 2009).

HIV experts and exploratory research has indicated that large RWP clinics provide some facets of medical home care (Beane et al., 2013; Saag, 2009). However, limited research extensively illustrates if and how a RWP clinic may deliver medical home care. While some RWP research has examined characteristics shared with the medical home, these studies were not purposely conducted with the medical home in mind. For example, 143 RWP funded and non-RWP funded clinics that provided HIV care were surveyed in 2004 (Valverde et al., 2004). The primary purpose of this study was to compare types of services offered, or care comprehensiveness, and patient populations across the two clinic types. The survey was mailed to personnel with adequate knowledge of site practices at each clinic and there was an 82% response rate.

After controlling for public versus private facility type, the RWP sites reported a wider range of service types than non-RWP funded clinics and the differences were statistically significant for most services measured (Valverde et. al., 2004). These

services included after hours care, transportation assistance, case management, multilingual staff, mental health services, substance abuse therapy, risk reduction counseling, onsite pharmacies, and adherence support groups. Additionally, RWP clinics were found to serve a larger percentage of uninsured patients and members of minority groups.

Valverde et al. (2004) mitigated the effect of RWP clinics offering more services because RWP patients have greater needs and controlled for public versus private facility type (Valverde et al., 2004). This study highlighted the wide range of services offered by RWP clinics. Comprehensive service delivery is a central principal of the medical home model (AAMC, 2008). Although this study did not directly examine medical home care, characteristics of the model were nonetheless measured and indicated many RWP clinics offer whole person-oriented care for PLWH more often than non-RWP clinics. For this reason, shifting patients from RWP settings to non-RWP settings may be detrimental to patients.

A more recent study, that examined data from the HIV surveillance Medical Monitoring Project, found that RWP clinics were more likely to provide support services such as case management, mental health services, and substance abuse counseling than non-RWP clinics (Weiser et al., 2015). Specifically, this study also found that low income patients were more likely to achieve viral suppression in RWP funded clinics as compared to those in non-RWP clinics. These data suggested RWP clinics are able to provide comprehensive care with positive health outcomes; however, this study was also limited to examination of one of the four chief medical home principles.

Beane et al. (2013) conducted key informant interviews with five RWP clinic medical directors and inquired about medical home practices. Medical directors were practicing physicians at five different RWP clinics with large patient populations across geographically diverse locations; two HIV quality or planning group directors were also interviewed. Beane et al. (2013) focused on key informant definitions of the medical home, types of services provided and coordinated at represented clinics, and if and how those clinics integrated medical home practices in service delivery. Informants overwhelmingly reported that their clinic of practice provided care reminiscent of the medical home prior to widespread use of the term. This is largely due to the variety of services offered at medical directors' clinics that included primary care, HIV management, gynecology, pediatrics, behavioral health services, and case management. Most clinics also offered oral health and dermatology services and had onsite pharmacies. Additional specialist services such as neurology, ophthalmology, and oncology were available at some sites.

Beyond the wide array of services offered, medical directors in this study articulated that care was coordinated by a team of collaborating providers that developed relationships with patients. Beane et al. (2013) highlighted that large RWP clinics are typically aligned with the medical home principles of comprehensive and coordinated care with a continuous provider. Additionally, several medical directors expressed concern for the quality of HIV care as PLWH gain private insurance and shift to non-RWP providers that may not be as experienced in HIV management. This study had a small sample size and limited engagement with providers; however, Beane et al. (2013)

showed that more in-depth research on the mechanisms by which RWP clinics may deliver medical home care is warranted and should be shared with non-RWP providers.

Mixed-Method Healthcare Service Delivery Research, Bayesian Approaches, and Case Study Methodology

This section of the literature review provides a brief overview of mixed methods used in healthcare service delivery research and case study methodology.

Mixed-method approaches to healthcare research. Mixed-method designs are valuable for studying complex phenomena, such as healthcare service delivery. Campbell and Fiske (1959) developed one of the first mixed-method designs in a paper on the multitrait-multimethod matrix that was used to assess convergent and discriminant validity. The matrix assumed that measures of the same trait using two different methods should have a high correlation. On the other hand, if those aforementioned methods are used to measure different traits the correlation should be lower. In summary, Campbell and Fiske (1959) pointed out the advantages to multiple method data collection.

Campbell and Fiske (1959) specifically referred to multiple quantitative methods. However, over time, qualitative and quantitative mixed-method data collection has gained popularity (Creswell & Plano Clark, 2006). *Quantitative data* are discrete or continuous numeric data that are collected using a measurement scale (Schwandt, 2007). Often collected using interviews or observations, *qualitative data* are non-numeric; rather, they focus on words and describe human behavior and experience (Schwandt, 2007). Mixed-method researchers often focus on the data collection process or methods of inquiry. However, Creswell and Plano Clark (2006) pointed out that mixed-method research is also a methodology with philosophical implications. Rigorous mixed-method

research is not an arbitrary combination of qualitative and quantitative data. Rather, the research questions should drive the purpose for selecting mixed methods and reflect the researcher's position.

Mixed-method research has been characterized as a design that rejects the views of paradigm purists and allows the researcher to use all available resources to gain information about a subject (Creswell & Plano, 2006; Schwandt, 2007; Tashakkori & Teddlie, 1998). Methodological triangulation is a chief benefit of mixed-method design. Results from each method serve as checks and balances for one another and provide a richer description. However, the benefits of mixed-method design are complicated by issues associated with combining different types of data and bridging paradigms. In this review, I primarily focus only on the issue of merging qualitative and quantitative data. Creswell and Plano (2006) stated,

> In short, it is not enough to simply collect and analyze quantitative and qualitative data; they need to be "mixed" in some way so that together they form a more complete picture of the problem than they do when standing alone. (p. 7)

Zang and Creswell (2013) summarized techniques used to combine data in a systematic review of 30 healthcare service studies that used a mixed-method design. They found three overall categories used to mix data: integration, connection, and embedding. The integration procedure involved concurrent qualitative and quantitative data collection with separate analysis of each, which was followed by a side-by-side comparison. The connection technique was used when qualitative data informed quantitative research design, explained results, or investigated outliers; quantitative data was also used to inform qualitative designs. Embedding described when one type of data was embedded in a larger study. For example, one research design embedded interviews

into a quantitative study. The qualitative data were then used to form a hypothesis concerning the numeric data.

Zang and Creswell's (2013) systematic review provided useful insight about how mixed-methods were applied and data were analyzed in recent healthcare service research. Specifically, many of the reviewed studies failed to adequately describe methodological procedures used to combine data types. Ostlund, Kidd, Wengstrom, and Rowa-Dewar (2011) also conducted a methodological review of approaches used to combine mixed-method data and concluded that only a small portion of these studies explained the rational for using a mixed-method design. Furthermore, O'Cathain, Nicholl, and Murphy (2009) conducted a qualitative study and interviewed health researchers about structural issues in mixed-method studies. Participants in this study confirmed that they struggled with integrating qualitative and quantitative data and that more expertise on mixing data was needed even among teams of researchers. These struggles also contributed to challenges publishing mixed-method health research. In summary, there is a need for more formal approaches to combining qualitative and quantitative data. Additionally, future mixed-method research should detail methodological procedures, such as the sequence and timing of qualitative and quantitative data collection, procedures used for mixing data, methodological limitations and discrepancies, and how the methods were selected and contributed to study goals.

Bayesian inference. With so much focus on why and how to mix research methods, Bayesian approaches deserve attention. I briefly outline the primary differences between Bayesian and frequentist statistics. Rather than tests of significance, the posterior is the final product used to drive the decision making process in Bayesian

inference. The posterior provides more information than a simple yes or no decision based on p values, which encourages binary thinking. Bayesian statistics estimate the probability of the hypothesis given the data instead of the probability of the data given the hypothesis as in frequentist statistics (Bolstad, 2007). The latter is more difficult to conceptualize and is therefore often misinterpreted (Carver, 1978). Furthermore, Bayesian inference allows for updating data based on actual occurrences as opposed to possibilities of occurrences or long-run frequencies (Bolstad, 2007). In this way, Bayesians are able to learn from data and change epistemic uncertainties. Epistemic uncertainty represents our knowledge or degree of belief around the parameter of interest. As the amount of information a researcher has increases, his or her epistemic uncertainty decreases (O'Hagen, 2004). Bayesians deal with epistemic uncertainty using subjective probabilities, which will be described in more detail later in this chapter. Frequentists oppose the use of subjective probability. Furthermore, unlike its frequentist counterpart, Bayesian statistics treats all unknown parameters as random variables because they represent a degree of belief (Ntzoufras, 2009). The data, or known value, is the fixed variable.

Bayesian inference is well positioned to deal with small sample sizes because the focus is on probability distributions rather than p-values which are influenced by sample size. For example, Speigelhalter (2004) illustrated how "equal P-values can lead to very different conclusions depending on the sample size" (p. 128) by providing an example showing that the larger the sample size the smaller the difference needed to result in significant p-values. The outcome of Bayesian inference is not influenced by extremely large sample sizes that often result in significant p-values regardless of the effect size

(Carver, 1978). Last, Bayesian statistics allow the researcher to weight the subjective prior and the data. Using this method, the prior can be given as much weight as the data even if the sample is small. This weight conveys the extent to which the researcher believes the data represent the sample (Bolstad, 2007).

Bayesian inference facilitates the combination of two sources of data on the probability of an event, in a systematic way, to create a comprehensive picture of the event in question. Arguably, combining sources of information provides a more accurate representation of the probability of an event than one source of data alone. Several researchers have used Bayesian statistics to formally combine qualitative and quantitative data in primary studies and meta-analyses; however, the technique is not widely used (Curlette, 2006; Ogletree, 2009; Roberts et al., 2002; Voils et al., 2009).

Bayesian statistics combine two sources of data by use of joint and conditional probability. Joint probability is the probability of two events occurring simultaneously. For example, the joint probability of A and B, for independent events, is the probability of A multiplied by the probability of B or $P(A)*P(B)$. Conditional probability is the probability of event A occurring given that event B also occurred or $P(A|B)$. Conditional probability reduces the universe of events because once B occurs anything outside of B is no longer possible. For $P(A|B)$ the only part of A that is possible is that which is also within B and is therefore dependent on the probability of B (Bolstad, 2007).

The foundation of Bayesian statistics is Bayes's theorem, and it has three main components: the prior, the data, and the posterior (Bolstad, 2007). The prior reflects knowledge or degree of belief about the probability of an event before the data are examined. However, it is important to note that the prior is not a temporal state. Cox

(1999) stated, "Prior does not refer to time, but to a situation, hypothetical when we have data, where we assess what our evidence would have been if we had had no data" (p. 30). For example, when a researcher sets out to test a group of individuals for HIV the prevalence of HIV in the general population is often already known. The HIV test results collected for the study, or the data, are also considered a probability because tests are imperfect because of false positives and negatives. Bayes's theorem provides the mechanism for updating the prior probability of an event, HIV prevalence, given the new data that become available, the test results, for the combined result of a posterior. The posterior is calculated by multiplying the prior probability with the likelihood function, which is then normalized (Bolstad, 2007). The posterior mean, median, or mode is used as the point estimate with credible intervals. A 95% credible interval is interpreted as the interval within which there is a 95% probability that the true parameter lies (Speiglehalter, 2004). Highest posterior density intervals are the shortest intervals containing points with the highest density such as the mode (Speiglehalter, 2004). After posterior estimates and credible intervals are computed, the posterior distribution is then examined for kurtosis or peakedness, skewness, and modality. Peakedness is the height characteristic of the curve, which is influenced by the variance of the posterior. Skewness refers to distribution curve asymmetry or the occurrence of many data points on one side of the distribution (Congdon, 2006). Positive skew refers to most of the distribution accumulating on the left of the curve with a smaller tail on the right. Negative skew is the opposite with most of the distribution on the right and the tail on the left. Modality is the attribute defined by the number of distribution peaks. For example, unimodality refers to

a distribution with one peak and multimodality refers to more than one peak (Congdon, 2006).

Bayes's theorem (Equation 1) translates to the probability of B, the prior, given A or P(B|A). In other words Bayes' theorem calculates the posterior or the conditional probability of the prior given the data, or the new evidence. $P(\tilde{B})$ is the complement of B or $1 - P(B)$ (Bolstad, 2007).

$$P(B|A) = \frac{P(A|B) \times P(B)}{P(A|B) \times P(B) + P(A|\tilde{B}) \times P(\tilde{B})} \tag{1}$$

Priors are classified as conjugate and nonconjugate. Conjugate prior distributions share the same distributional family as the posterior distribution (Ntzoufras, 2009). For example, the beta distribution is a conjugate prior of the binomial distribution and the gamma distribution is a conjugate prior of the Poisson distribution. Nonconjugate priors are from different distributional families.

Priors are characterized as uniform, or low information, and high information. When little prior information exists, an uninformative prior distribution with a large variance is used to reflect that uncertainty. In this case, the posterior distribution reflects the data more so than the prior. High information or informed priors are used when relevant information is available and are characterized by smaller variances that are weighted more heavily in the posterior distribution (Ntzoufras, 2009). Informed priors may be elicited from subject matter experts and reflect his or her degree of belief. The researcher's assumptions are transparent, reflected in the type and weight of the prior, and are explicitly entered into the equation (Mays et al., 2005).

Subjective Bayesian priors. Subjective priors are a topic of debate and are based on the subjective theory of probability presented by Gillies (2006). The conceptualization of logical theory preceded subjective theory and was developed at Cambridge University primarily by John Keynes (Gillies, 2006). Both probability theories are based in epistemology, or the study of knowledge and belief, and are dependent upon human interpretation. Logical theory is based on rationality or the notion that different persons will interpret the probability of an event the same way if provided the same information. Logical probability theory is a rationalization of inductive reasoning and is based on Keynes's Principle of Indifference, which states that when no other information is known, alternatives have equal probabilities (Gillies, 2006). However, the Principle of Indifference is not universally applicable.

On the other hand, the subjective theory of probability solves many of the issues associated with logical theory. Subjective probability is a measure of epistemic uncertainty (O'Hagen 2004). Epistemic uncertainty represents a lack of knowledge or information. On the other hand, aleatory uncertainty represents variability due to randomness, which is captured by long-run frequency probability. Subjective probability theory characterizes probability as varying from individual to individual with unique degrees of belief about the probability of an event. This is a departure from the logical theory requirement that there is a consensus about the degree of belief (Gillies, 2006). Subjective priors may be based on expert knowledge, qualitative data, or relevant every day experience (Gill & Walker, 2005).

Press (2003) emphasized that subjective priors are informed and that they introduce a degree of personal interpretation. However, a subjective prior is not a license

to assign probabilities haphazardly. Smith (2010) asserted that an expert's subjective prior must follow common rules of probability; reflect the expert's degree of belief; and appear possible, logical, and reasonable to an outsider. Priors that are elicited from experts in a systematic manner can contribute valuable information otherwise lost using purely quantitative methods or uninformed priors (Gill & Walker 2004; Press, 2002; Smith, 2010). I describe the process and considerations for eliciting priors in more detail in the next section.

Bayesian statistics are able to uniquely incorporate two sources of information and posterior distributions can be updated as new data are collected. Each time new data become available, the previous posterior distribution can be used as the prior in the new model (Bolstad, 2007). Each time data are added the posterior may change and the extent of that change depends on the sample size and variance of that data.

Prior elicitation. Prior elicitation is a process used to draw probability distributions from information provided by subject-matter experts. Non-statisticians can contribute useful information to a study in the form of an elicited prior (Gill & Walker 2004; Press, 2002; Smith, 2010). One method of prior elicitation involves structured interviews in which the researcher presents scenarios and the expert provides his or her belief about the probability of an event or levels of an event by assigning a probability or value.

Prior elicitation is a process that requires strategic planning. Heuristics can skew probability assignments in a way that inaccurately reflects the expert's knowledge. Therefore, the manner in which events are described to subject matter experts must be thoughtfully considered to reduce bias (Smith, 2010). The role of the researcher is to

elicit prior probabilities that closely represent the expert's belief without influencing the outcome. Gill and Walker (2004) discussed this process in the context of political science research and offered three stages: the deterministic, probabilistic, and informational phases.

In the deterministic phase, the researcher plans and defines the variable of interest. Clear definitions in language familiar to the expert are requisite to obtaining priors that accurately reflect the expert's belief. During the deterministic phase, scenarios that will be presented to experts are established and the parametric form that best represents the prior is selected. The sample size and selection criteria for experts is determined as is the means for appraising the quality and reliability of the elicited priors (Gill & Walker, 2004).

The probabilistic phase is when the interviews occur and the priors are elicited. If probabilities are directly elicited, experts should be trained on probability distributions and the prior elicitation process to improve the quality of information collected (Smith, 2010). Gill and Walker (2004) discussed three categories of responses that are elicited from experts. P-methods involve the presentation of a scenario with an attached value and the expert assigns a probability to how often that value occurs. P-methods are generally the most straightforward. V-methods are the converse and require the expert to assign a value to a given probability of an event. PV-methods are often too challenging for most non-statistician experts to conceptualize because they involve cumulative distributions. For this reason PV-methods may be vulnerable to prior assignments that fail to reflect the expert's belief. Press (2002) proposed that the expert also provide a qualitative

explanation for each probability he or she assigns. These descriptions allow the researcher to assess the underlying reasons a probability was assigned.

Last, the informational phase is when expert's assigned probabilities are assessed for reliability within each individual and between experts (Gill & Walker, 2004). For example, when multiple probabilities are assigned by one expert, those probabilities should be consistent. A probability assigned for a subset of events should be within the range assigned to the larger overarching set of events. Contradictory ratings or low internal consistency indicates that the expert may have failed to understand the probability context.

There are a number of ways to assess the reliability of an expert's probability assignments. This work typically takes place after the interview but to some extent can occur during the elicitation process. For example, an expert may be shown the distribution that reflects the assigned probability and asked to revise the assignment if needed. Assignments between raters that provide widely different ratings from one another are assessed to evaluate factors, such as years of experience in a field, which may lead to such inconsistencies.

Press (2002) detailed a process for revising experts' probability assignments. First, experts assign probabilities and provide a written rationale. Expert's reasons for respective probabilities are analyzed and placed into groups based on shared characteristics. This summarized analysis is then presented to the experts, and they are asked to revise the previous probability assignments if needed.

Smith (2010) outlined best practices for prior elicitation that mitigate common issues, such as the availability, anchoring, and support theory heuristics. The availability

heuristic occurs when readily available information is used to assign probabilities to events (Smith 2010). For example, airplane crashes are newsworthy headlines while safe flights are not; therefore, one may think the probability of being involved in an airplane crash is higher than in reality. Balancing the availability heuristic involves providing information on the complement event for which information is not as readily available. The anchoring heuristic occurs when the expert assigns a probability near a presented option or example (Smith 2010). For example, a healthcare provider is tasked with assigning the probability that any given patient is able to book a same-day appointment and is provided with the following example: 50% of the time is five successfully booked same day appointments out of 10 attempts. Given this information, the expert is less likely to assign an extremely low prior because the example represents the midpoint and the expert is likely to start there and adjust slightly up or down. The support theory heuristic occurs when multiple similar examples of an occurrence are provided when describing an event to the expert (Smith 2010). The more descriptions or examples provided, the higher the assigned probability. The support theory heuristic can also be minimized by providing descriptions of the complement event.

    Bayesian approaches to mixed-method research. For the purpose of this literature review, I focus on the advantages of Bayesian methods to combine qualitative and quantitative data. Curlette (2006) outlined a Bayesian approach to mixed-method research. His computational example focused on Individual Psychology; however, Bayesian mixed-method approaches have applications across diverse fields. Curlette's (2006) approach introduced informed, subjective priors based on interview data. Quantitative data were collected using a psychological inventory of social interest scales.

Bayes's theorem was used to calculate the probability of the prior given the data. Ogletree (2009) also used this method with narrative inquiry and historical survey data to inform priors.

Others have used Bayesian methods to incorporate qualitative and quantitative data in healthcare service delivery meta-analysis (Roberts et al., 2002; Voils et al., 2009). Meta-analysis synthesizes data across studies and uses the effect size as the point estimate and common metric because studies do not use the same instrument or statistic (Borenstein, Hedges, Higgins, & Rothstein, 2008). Bayesian statistics and meta-analysis are natural companions because both are adept at incorporating multiple sources and new data as they become available. Traditionally mixed-method studies and systematic reviews have been limited to thematic approaches to combine quantitative and qualitative data. Mixed-method, Bayesian meta-analyses have slowly gained popularity and are beneficial because more diverse studies may be included (Dixon-Woods et al., 2001; Dixon-Woods et al., 2005; Mays et al., 2005). A small number of these studies are reflected in the current literature; studies that analyzed primary data as described by Curlette (2006) are not. However, Bayesian techniques are fundamentally the same whether used to analyze primary or secondary data.

Roberts et al. (2002) conducted a mixed-method, Bayesian meta-analysis and assessed factors that influenced the acquisition of childhood immunizations. The reviewers were all parents who had at some time been responsible for immunizing a child and also understood basic statistical methods. Roberts et al. (2002) discussed the relevance of informed, subjective prior probabilities when lay beliefs, such as that of parents, are meaningful. To estimate the priors, reviewers first ranked factors related to

immunization uptake, which they then revised based on a review of qualitative studies that met the inclusion criteria. The techniques employed by Roberts et al. (2002) for eliciting priors specified that qualitative studies were read in a randomized order and reviewers described why and how beliefs were updated. Bayes's theorem was then used to combine the prior probabilities with data extracted from quantitative studies. This study was the first of its kind to incorporate qualitative research into a meta-analysis using a Bayesian approach and subjective priors.

Other applications of mixed-method, Bayesian meta-analysis included a synthesis of studies on HIV antiretroviral medication adherence by Voils et al. (2009). This study differed from Roberts et al. (2002) because a uniform prior was entered into the model with data from both qualitative and quantitative studies as the data. Reviewers coded qualitative studies based on verbal counts of mentions of the association between regimen complexity and adherence. Survey statistics were directly extracted from the quantitative studies.

Case study approaches to healthcare service delivery research. Researchers should carefully consider the methods that will best address research questions. Health-care service delivery research is well suited to case study design because examining complex systems requires flexible methods (Anderson, Crabtree, Steele, & McDaniel, 2005).

Anaf et al. (2007) described healthcare delivery as a system comprised of multiple parts that give rise to interdependence and exchanges between those parts; therefore, case studies can be particularly effective for understanding those relationships. Case studies are a practical way to examine the complex nature of systems because they embrace a

holistic perspective within the context of the system's current functions and environment (Stake, 1995).

Case studies may collect quantitative data but primarily include qualitative methods, such as observation, interviews, archives, and document and artifact analysis (Yin, 2009). The primary goal of qualitative research is to describe a situation, culture, behavior, phenomenon, or system and answer questions such as "how" or "why" (Merriam, 2009). Merriam (2009) described case studies as appropriate for describing a "bounded system" (p. 40). Yin (2009) noted the importance of the context in which a phenomenon occurs in case study research. Case study methodology is appropriate when context and phenomenon are not easily separated or when it is unclear where one begins and the other ends. This requires studying the phenomenon in its natural environment and without manipulation. Although explanatory case studies seek to explain causes, case studies do not control variables because the emphasis is on understanding current and complex real life situations.

Case study is an appropriate methodology for studying healthcare systems because it can be difficult to differentiate between the system and contextual factors, such as policies, procedures, physical building space, hiring systems, and provider and patient characteristics and circumstances. For example, the physical building space may influence how care is delivered because of the number of examination rooms available for rotating patients. Luck, Jackson, and Usher (2006) explained that while case study examples have been utilized as a teaching tool in medicine, they have not been adequately employed as a valuable research methodology within medical fields, such as nursing, because of the focus on clinical research. These authors challenged healthcare

researchers to adopt the case study design to gain knowledge of processes and phenomena that cannot be understood with laboratory studies or clinical trials.

In summary, there is a natural alignment between healthcare service delivery research, systems science, Bayesian mixed-method approaches, and case study methodology. Healthcare is an example of a complex system that may not be fully understood with purely quantitative methods. Case study research that uses a Bayesian mixed-methods approach is positioned to reap the benefits of evaluating healthcare in its natural environment with formal mechanisms to combine qualitative and quantitative data.

CHAPTER 3

METHODOLOGY

This research was guided by three goals: (a) to determine how well clinic-delivered RWP services demonstrated the characteristics of the medical home model, (b) to describe how these services were delivered within a particular case, and (c) to demonstrate how using a Bayesian approach to combine these data to produce results that better inform decision-making. The context for this study resulted from conversations about how to use a case study design and link qualitative and quantitative data to examine healthcare service delivery at RWP HIV clinic. In this chapter, I describe the qualitative and quantitative framework for my study and how I linked the two using Bayesian statistics. Research questions and methods are also outlined in this chapter.

Descriptive Case Study Design

I used mixed methods to evaluate if and how a RWP clinic provides medical home care from the perspective of both patients and staff. I used a descriptive case study design with a single case to answer my research questions. An experimental design was not appropriate because my study sought to describe healthcare delivery in its natural setting and without manipulation. I collected data from patients and staff using surveys and interviews.

The unit of analysis for this case study is an RWP-funded clinic in a large city in the southeastern United States. The clinic was established in the mid-1980s, early in the HIV epidemic. The clinic is one of the nation's largest providers of HIV care, lending aid to over 5,000 PLWH and affected families. Patients must have an AIDS-defining illness or a CD4 cell count of less than 200 to receive services at the Clinic because funding is

reserved for the sickest patients with HIV. The clinic receives RWP Parts A, B, and D funding.

I selected a single case study design for three reasons. First, a case study is appropriate because context is integral to the delivery of healthcare services; healthcare delivery cannot be understood without situating it within the context in which it occurs. Second, there are no clear boundaries between the provision of healthcare delivery and the clinic itself, which is a bounded system. Third, I sought to conduct an in depth and rich examination of healthcare service delivery at the site and case study methodology facilitated this type of research. Yin (2009) suggested case study methodology for examining current and bounded phenomena in the setting in which they occur, especially when controlling variables is not a research focus. In an exploratory study, this clinic was found to have characteristics that resemble other urban/metropolitan RWP clinics with large patient populations, so it is a typical case (Beane et al., 2013). The typical case is a variation of single case design (Yin, 2009).

Study validity. For this study I discuss validity as it relates to case study research. Construct and external validity pertained to my case study. Internal validity is only relevant to explanatory or causal case studies (Yin, 2009). To assess construct validity in a case study the constructs are operationally defined and data are collected using multiple sources of evidence and assessed for triangulation (Yin, 2009). I assessed construct validity for my study by first operationalizing medical home care. Next I collected and analyzed data from surveys and interviews and compared data collected using each method. This study focused on four essential medical home care constructs: first contact access, ongoing care, comprehensive care, and coordinated care (AAMC, 2008; Stange,

Nutting, Millerm Jaen, Crabtree, Flocke & Gill, 2010). I used the provider and patient version of the PCAT survey to collect quantitative data to measure the aforementioned constructs. The PCAT's alignment with medical home domains was assessed by nine content area experts who rated items for each domain and those that aligned with each construct were selected for the tool (Shi et al., 2001). Next, I operationally define each construct.

The first construct, first contact, describes the accessibility and utilization of care from or coordinated by a primary care provider when a patient enters into the healthcare system and when a new healthcare need arises (Pandhi et al., 2011). For the purpose of my study, first contact care is operationally defined by four criteria. The first and second criteria apply to the availability of same day appointments and telephone advice for acute conditions during office hours. The third and fourth criteria are that after-hours advice and urgent care appointments for acute conditions are available. These criteria are based on standards set by the National Committee for Quality Assurance (NCQA) for medical home care (NCQA, 2014).

In regards to coordinated care within the medical home, Stange et al. (2010) focused on directed care for all of a patient's needs. Coordinated care is guided by a trusted advisor within the healthcare system. Coordination prevents care fragmentation or failure to access needed services. Case managers, patient navigators, or primary care providers may coordinate care for patients. For my study coordinated care is operationally defined by the provision of referrals for specialty services, assistance making specialist appointments, and communication between the primary care provider,

specialist, and patient. These criteria are based on the NCQA's definition of coordinated care within medical home standards for certification (NCQA, 2014).

Ongoing care (Stange et al., 2010) is the provision of continuous care at a medical home on a longitudinal basis. Ongoing care occurs when a patient consistently seeks and receives care at the same clinic and from the same provider for preventative services and for acute and chronic care. For my study, I operationally defined continuous care as the availability and provision of care from the same primary care provider on an ongoing basis. Furthermore, the provider should have knowledge of the patient's medical history and personal circumstances. These criteria are based on the literature and the NCQA's definition of continuity for medical home certification (NQCA, 2014; Stange et al., 2010).

Comprehensive care entails the provision of primary and preventative care, specialty care, and support services for acute and chronic conditions (Stange et al., 2010). I examined a curriculum developed by a panel of expert HIV providers, with over 100 years combined service, for the Southeast AIDS Training and Education Center to operationally define *comprehensive care*. The curriculum was created to provide new HIV clinicians with the knowledge necessary to provide comprehensive care to PLWH either directly, at the site of practice, or via referrals. Based on this curriculum, comprehensive care is defined as a minimum of primary care including immunizations and preventative screenings; HIV treatment including diagnosis, prescription of ART, laboratory testing and monitoring, and management of co-morbid conditions and opportunistic infections; medication adherence support; obstetrics and gynecology; mental health services; and substance abuse counseling. This definition is contained

within but more comprehensive than NCQA's medical home standard (NQCA, 2014; Stange et al., 2010).

External validity as it pertains to statistical generalization from a sample to a population is not possible in case studies. Patients were randomly sampled for the PCAT survey and interviews; however, randomization for case selection is not always possible or preferable. Most cases are selected because they possess unique characteristics and the context of the case is particularly crucial to the study.

According to Yin (2009) case study external validity singularly addresses theoretical or analytical generalization. Selection of the case is important for theoretical generalization and that is why I selected a case typical of large urban RWP clinics. Stake (1978) argued that because case studies describe phenomenon or tell a story, they are in fact generalizable. Stake (1978) refers to this type of generalization as "naturalistic generalization," whereby the reader draws contrasts and comparisons from his or her own experiences and understanding.

Furthermore, Flyvbjerg (2006) argued that context-dependent learning is the foundation of expertise development; therefore, knowledge that is not necessarily generalizable to a population is still important and contributes to research. Notably, most social science theory is context-dependent. Flyvbjerg (2006) stated that many discoveries in the hard sciences occurred not by randomized trials but rather as the result of concentrated attention on one case. Furthermore, a single case may be enough to disprove blanket theories. Lincoln and Guba (1985) used the term "transferability" to describe generalizability to another context and recommended thick description in reports, or sufficient detail about the case, to establish case study relevance to other settings (p. 328).

Assessing study reliability. In quantitative research, reliability generally refers to the stability of the data collection instrument and procedures. However, case study experts mention reliability as it relates to qualitative research (Yin, 2009). Reliability is also relevant to qualitative research, but it is couched in different terms. For example, Lincoln and Guba (1985) use the alternate term, "dependability," to describe the consistency of research results (p. 300). One method of documenting that consistency is production of a detailed record of the steps used in conducting the case study so that readers may examine the methods and procedures of the study and follow them to the research outcomes. No case study of social situations can be replicated, but an auditing reader can assess the decision-making process to judge if it meets the standards for qualitative analysis within the context of the case.

Specific documenting techniques produce what Yin (2009) described as "chains of evidence" (p.122). A logical progression from research questions, to the data collection processes, to the analysis, and to the results is supportive of reliability. Each step from theory selection, literature review, propositions, sources of evidence, and results should be supportive in either direction. Additionally a case study database should house all data collected (Yin, 2009).

Quantitative and Qualitative Link

For this study, I combined quantitative and qualitative case study data using Bayesian statistics (Smith, 2010). Collecting both qualitative and quantitative data provided more information about the clinic's processes than one type of data alone. Additionally, it was pragmatic to include data from both patients and staff to provide a rich description of care delivery at the site. The patient experience at the clinic bears as

much weight as that of the staff in the overall description of the clinic. Furthermore, data from patients and staff were assessed for similarities and differences.

Patient interview and survey data were combined for posterior distributions that reflected patient ratings of and experiences with healthcare service delivery at the clinic. Staff interview and survey data were also combined for posterior distributions that describe staff ratings of and experiences delivering healthcare services. Using Bayesian statistics, I calculated two sets of posteriors describing medical home constructs, one set for patients and one for staff.

Patient data. Historical quantitative PCAT survey data were collected from a random sample of patients (n = 98) at the clinic for a previous study. The variance from these results was used as the known variance in the Bayesian formula for normal updating. For this study, the PCAT survey was conducted with 20 patients and interviews were conducted with an additional 10 patients. Patients were randomly sampled and every third patient was assigned to the interview group.

Staff data. For the purpose of this study, staff refers to care providers such as physicians, nurses, mental health and substance abuse counselors, case managers, and administrators that directly oversee patient care. Historical provider PCAT surveys were collected from 12 staff at the clinic for a previous study. As with the patient data, the variance from these results was used as the known variance in the Bayesian formula for normal updating. For this study, a snowball sampling strategy was used to recruit 16 staff to complete the provider PCAT survey and to recruit an additional 8 staff to participate in interviews.

Quantitative Framework

This study links quantitative and qualitative data and here I describe the quantitative framework. I begin with a description of subjective probability theory then describe Bayesian inference and prior elicitation.

Subjective probability theory. Objective probability theory is based on observed occurrences, has no basis in human belief, and is typically applied the natural sciences. Objective probability has the advantage of reducing researcher-introduced bias because it is grounded in empirical evidence (Gillies, 2006). Unlike objective probability, subjective and logical probability theories are both based in epistemology and degree of human belief (Gillies, 2006). Logical probability theory views belief as rational in that all persons with the same information will have the same degree of belief. Subjective probability theory abandons the notion that rational belief results in agreement about the probability of an event and allows for varying degree of belief from one individual to another (Gillies, 2006). Consensus is not an a priori requirement of subjective probability as it is for logical probability.

Subjective probability theory is germane to medical decision making (Roberts et al., 2002). Sullivan (2003) discussed the strong relationship between a patient's perceived well-being, beliefs, and actual health outcomes. Because of the influence of beliefs and perception of quality of life on individual health goals, Sullivan (2003) recommended that providers resist unilateral decision-making and incorporate the patient's beliefs and expectations for joint decision-making. This type of medical decision-making weights the patient's input as much as the provider's. It is problematic to describe healthcare service delivery from the stance of objectivity probability because it fails to include patient and

provider belief. Statistics on the efficaciousness of healthcare services are as important as patient and provider experience and belief; therefore, subjective probability is especially useful in healthcare service delivery research. Subjective probability theory is the basis of this study's quantitative framework.

Bayesian inference. I chose to link qualitative and quantitative data using Bayesian statistics because subjective probability theory can be applied using Bayesian inference through the use of subjective priors. I used Bayesian inference to incorporate staff and patient beliefs, collected during interviews for research question 2, with survey data from staff and patients respectively, collected for research question 3. Interview data were used to estimate subjective priors, and PCAT results, in the form of summated Likert scales for each domain, were used as the data in the Bayesian analysis. Posteriors were calculated separately for staff and patient groups with one posterior for each of the medical home domains. See Table 1 for a summary of the Bayesian research design and sources for the priors and the data for each sample's posterior.

Prior elicitation. Subjective Bayesian priors involve the process of prior elicitation, which is a method of extracting knowledge for estimating priors. Gill and Walker (2005) outlined four phases of the formalized prior elicitation process. The first process in prior elicitation is the deterministic or planning phase where variables,

Table 1

Bayesian Research Design

Sample	Prior Source	Data Source	No. of Posteriors
Staff	Interviews ($n_1 = 8$)	Provider PCAT ($n_2 = 16$)	6
Patients	Interviews ($n_3 = 10$)	Patient PCAT ($n_4 = 20$)	7

parametric forms, sampling, and data collection processes are assigned. The deterministic phase of my study is specified as follows: I elicited clinical priors, based on medical home domains and subdomains, from staff and patients using interview as the data collection method. Gill (2002) described clinical priors as those elicited from study participants knowledgeable about the subject of interest. The medical home constructs that underlie my study's variables are first contact access, first contact utilization, ongoing care, coordination of services, coordination of information systems, comprehensive services available, and comprehensive services provided. Priors for these variables had a conjugate normal distribution, which I estimated from interview data. Conjugate priors are from the same distributional family as the data and are more computationally efficient than non-conjugate priors from different distributional families (Ntzoufras, 2009). I interviewed 10 patients and 8 staff to elicit information to estimate priors for each variable. A complete sampling strategy is described later in this chapter.

The probabilistic phase of the elicitation process consists of data collection or the actual interview (Gill & Walker, 2005). I conducted semi-structured interviews with 10 patients and 8 staff over the course of one month. An interview script was used to guide interviews, and they were audio recorded. See Appendices A and B for staff and patient interview scripts.

In the informational, phase priors are assessed for consistency and coherence and are weighted if needed (Gill & Walker, 2005). Consistency refers to differences between assigned probabilities for related variables. Coherence refers to valid probabilities across events that cannot occur at the same time (Gill & Walker, 2005).

For my study, priors were estimated for each interview participant based on an analysis of interview transcripts. Participants' descriptions of services that included words such as "never," "sometimes," "most of the time" or "always" were used to determine if the most appropriate prior rating was *definitely not*, *probably not*, *probably*, or *definitely*. Individual estimates were then averaged for each domain, and I used domain averages as the priors for each domain.

Qualitative Framework

Qualitative data were collected to describe if and how medical home care is delivered at the clinic. Qualitative data is descriptive in nature and contributes to understanding a phenomenon in its context. For this reason, most qualitative research does not seek to manipulate variables. Participant experience and perception are central to qualitative research. Qualitative researchers seek to answer "how" or "why" questions with depth and detail (Merriam, 2009). Methods such as interviews, observations, and document and artifact analysis are used in qualitative research (Schwandt, 2007). Qualitative researchers are largely concerned with the participant's point of view (Merriam, 2009). There are several types of qualitative research, such as phenomenology, ethnography, grounded theory methodology, narrative inquiry, and case study.

Qualitative methodologies. Phenomenology is a methodology focused on the everyday life experience, or lifeworld, and perceptions of individuals (Schwandt, 2007). A detailed explanation of the variants of phenomenology is beyond the scope of this dissertation; however, all variations focus on the subject's point of view in everyday life. In addition to perception, phenomenology is concerned with how individuals remember events or experiences, how that experience made him or her feel, and how the individual

judges the experience. Ethnography is a methodology that describes behavior within a specific culture. Ethnographic data are collected through observations in the field and requires extensive field notes (Schwandt, 2007). Grounded theory is a methodology for building theory from data, through the constant comparison method, which is then doubled-checked against additional data that are collected (Schwandt, 2007). Narrative inquiry is concerned with the examination of individual's life stories (Schwandt, 2007). Case study examines a bounded phenomenon such as an organization, group, system, or process in the natural setting.

Case study. Case study is the methodology used for this study and therefore warrants a more detailed description. Case study methodology is appropriate when context and phenomenon are not easily separated or when it is unclear where one begins and the other ends (Yin, 2009). Case study is a powerful methodology when the researcher seeks to describe a current phenomenon within the setting and context of that phenomenon. Context is important to case studies because it is a methodology used to learn about the intricacies and nuances of the case instead of answering specific questions about a manipulated variable. Stake (1978) asserted that a case is not limited to a single person but can be an organization, group, or population. For example, a researcher may conduct a case study of an organization to understand how processes occur and why decisions are made. This requires study of the phenomenon in its natural environment and without manipulation. Although explanatory case studies seek to explain causes, case studies do not control variables because the emphasis is on understanding current and complex real life situations through the use of multiple sources of data that are assessed for convergence (Yin, 2009). Multiple data sources are necessary because a single data

collection instrument or method is insufficient to answer the complex questions that warrant a case study research design.

Most qualitative researchers agree that case study methodology focuses on current and complex situations; however, there is some disagreement as to what constitutes a case study. Yin (2009) stated that the hallmark of case study methodology is the manner in which the study is designed and data are collected and highlighted the role of theoretical propositions that guide the case study process. Stake (1995, 2005) departed from this definition and simply emphasized the unit of analysis, with identifiable boundaries and a specific rather than broad context, as the defining element of a case study. While Yin (2009) used more complex criteria than Stake (2005) to define a case study, he too conveyed that the unit of analysis and associated boundaries are critical for developing research questions, propositions, and containing the extent of data collection and analysis. The unit of analysis and boundaries should inform the scope of the study or where the study begins and ends. For example, the unit of analysis in my case study is a clinic and the boundaries limit data collection and analysis to processes and services within the clinic's building or coordinated by staff that work at the clinic. The unit of analysis does not extend to services that are not provided or coordinated by clinic staff. Case studies are largely concerned with context and complex systems; therefore, predefining boundaries directs priorities and focus for what could potentially result in never ending layers of data collection (Yin, 2009).

Case study propositions direct data collection (Yin, 2009). The roles of propositions are to state what is important about the case and its context and to constrain the study's boundaries by providing a focus and intent. Lincoln and Guba (1985) stressed the

role of theory development in case study research because the theory guides the design, research questions, and propositions. The theory directs the proposition or why the researcher wants to study the case.

Case study research employs a variety of methods to describe a phenomenon. It is the culmination of data from these methods that describes a case and these data are used to assess triangulation or the extent to which data from multiple sources converge (Yin, 2009). Methods used to collect data in case study research may include document analysis, archives, artifacts, interviews, direct observation, and quantitative methods such as surveys.

Documents. Documents include public or private records, such as journals, medical records, or meeting minutes (Schwandt, 2007). Both the strength and limitation of sources of documentation is that they are not produced for research purposes (Yin, 2009). The strength of documentation as a source of evidence is that the data do not reflect the researcher's ability to ask the right questions or gain the trust of interviewees. Furthermore, documentation is typically free of social desirability bias introduced by participants in a research study. On the other hand, documentation may be biased in other ways. For example, organizational documents may reflect the views of high level employees more so than entry-level staff. Furthermore, documentation can be difficult to corroborate if those that produced it are deceased or are no longer employed by an organization (Yin, 2009).

Archives and artifacts. Archival records are similar to documentation in that they are not created for research. One distinction between documents and archives is that documentation is narrative and archives are numerically based (Yin, 2009). For example,

databases of the number of staff employed in various positions and years of experience at a clinic are archival records. Artifacts are typically material objects, such as works of art, musical compositions, or written works, that can reveal information about a person or culture (Schwandt, 2007).

   Interviews. Documentation and archival records are typically used to support data from interviews, a common source of evidence in case studies. Interviews can be structured with forced option responses, unstructured, or semi-structured (Schwandt, 2007). For this study I conducted semi-structured interviews. Well planned semi-structured interviews can provide detailed and nuanced information about participants' experiences. Qualitative interviewing requires a different set of skills from that of highly structured interviewing such as census data collection. Qualitative interviewing is typically semi-structured, and the interviewer must develop a rapport with participants so that they are comfortable enough to discuss topics that may be sensitive or personal. This requires that the interviewer understand the research topic and evaluate his or her preconceived notions about participants. Like everyone else, researchers have life experience that shaped belief systems, and this must be recognized early in the research design process.

   Open-ended interviewing can encourage the interviewee to provided rich description through the use of carefully posed questions and probes. Sincerely listening to the interviewee is as important as asking the right questions. Good listening skills, body language, and eye contact can evoke quality information (Kvale & Brinkmann, 2009). Interviewers must be flexible because participants may not immediately open up to the interviewer or they may digress from the topic at hand. The interviewer's role is to keep

the participant on track; however, unrelated information can be enlightening and should not be completely dismissed. The interviewing process requires that the interviewer take cues from the participant and look for information that may not be directly revealed but is otherwise indicated by words, emotion, and body language. The way in which questions are asked of participants influences the type of information a participant provides.

Furthermore, interview questions are very different from research questions. Research questions may be too esoteric and broad for participants to provide useful and unbiased information. For example, "How does the clinic provide medical home care?" is an inappropriate interview question. A better question is, "Can you tell me what a typical day at the clinic is like for you?" Interview questions should avoid leading language and biasing the participant toward a certain response. Leading questions direct a participant to respond in a certain way or make an assumption about the participant or the interview topic (Kvale & Brinkmann, 2009). For example, the former question may influence a participant to describe the clinic as a medical home while the second question is unbiased. Last, details such as the location of the interview and the dress and speech of the interviewer can also influence the information a participant divulges.

Direct observation. Unlike interviews, direct observation is unique in that there is no interaction between the researcher and the participant. Direct observation is a method to learn about behaviors and actions by watching events in a way that disturbs the participants as little as possible (Yin, 2009). Undoubtedly, observation and the presence of an investigator will influence how events unfold to some degree (Yin, 2009). The researcher may have an observation form and record occurrences of predefined behaviors. Alternatively, the researcher may observe with no predefined notion of what to

look for and take notes. A limitation of observations are that visual representations constrain the researcher's understanding of participants' perceptions and experience.

Methodological Rationale

Case study rationale. Over the years, case studies have been increasingly used to research and evaluate programs (Yin, 2000). Anaf et al. (2007) recommended the case study as a methodology for examining healthcare delivery within a systems theory framework. Healthcare systems are complex systems that adjust and modify processes as they respond to a variety of changing conditions, such as political climates and disease outbreaks. The case study is fitting for observing those processes because the focus is on current behaviors, procedures, and interactions instead of manipulating variables. Anaf et al. (2007) provided an example of a case study on the integration of physiotherapists in an emergency room to highlight how the case study approach was most fitting to examine the hospital's integration process. Luck et al. (2006) described case study methodology as an effective means to bridge the gap between rigid healthcare research, such as random-ized clinical trials, and patient case studies that are used as a teaching tool. Randomized trials lack the flexibility needed to study complex systems. Teaching case studies, or presentations of hypothetical patient cases and conditions, highlight the value of learning from real life situations (Luck et al., 2006). However, case study as research method-ology is flexible and can reap the benefits of learning from real life situations through the use of rigorous research design.

Stake (2005) indicated that case study was an appropriate methodology for studying a phenomenon where the unit of analysis is naturally bounded. My study's unit of analysis, a RWP-funded HIV clinic, is naturally bounded by the physical bounds of the

clinic building and the services provided inside the building or coordinated by staff that work at the clinic location. Furthermore, case study methodology is fitting because context is integral to and largely influences healthcare service delivery. Context includes clinic policies and procedures, systems for documenting patient medical records, funding and billing, physical building space, hiring systems, providers, and staff. For example, the physical building space may influence how care is delivered because of the number of examination rooms available for rotating patients which in turn affects appointment wait times. In the case of healthcare service delivery, the provision of services and context are difficult to differentiate, yet the clinic as a case has clear boundaries. In summary, context often determine patterns of behavior that occur in systems suitable to case study research (Stake, 2005). Moreover, my research fits Yin's (2009) description of a case study because my research seeks to describe the current characteristics of healthcare service delivery at a clinic, a modern system with defined bounds, through the use of multiple data collection methods guided by theoretical propositions. This study's theoretical propositions are outlined later in this chapter.

The variety of methods employed in case studies is useful for richly describing a complex system such as healthcare service delivery. I used a descriptive case study design to examine if and the extent to which an RWP-funded clinic exemplifies characteristics consistent with the medical home model of healthcare delivery. Case studies are often classified as a qualitative research methodology; however, case studies are flexible and may include quantitative data for a mixed-method approach (Yin, 2009).

BCSM rationale. Case study methodology parallels many of the characteristics and strengths of Bayesian inference, making the BCSM a particularly strong approach for

examining healthcare systems. The combination of a Bayesian approach with case study design for this research provided a research methodology more powerful than either alone. See Table 2 for a summary of these parallels.

Both case study methodology and Bayesian inference are conducive to mixed-method studies. Bayesian statistics incorporate qualitative evidence with quantitative data through the use of subjective priors (Press, 2003). Likewise, case studies can include both qualitative and quantitative data.

Both case study methodology and Bayesian inference are well suited to descriptive studies with small sample sizes. Case studies seek to provide rich description of the case and large samples are rarely conducive to such a detailed examination (Yin, 2009). Furthermore, case studies are focused on specific cases of interest, and, therefore, large samples that fit the case definition may not exist. Bayesian inference and case studies both focus on description and therefore are not concerned with traditional tests of statistical significance. Bayesian analysis results in posterior summary statistics and probability distributions, so large sample sizes are not necessary. Bayesian analysis is also fitting for small samples because the analyst may assign the implicit sample size,

Table 2

Bayesian/Case Study Characteristic Alignment

Characteristic	Bayesian Analysis	Case Study
Methods	Mixed-methods	Mixed-methods
Sample Size	Small to large	Typically small
Descriptive Data	Posterior estimate, distribution	Rich description
Convergence	Variance, distribution peakedness	Triangulation, saturation

which is a way of weighting the prior sample with the data (Bolstad, 2007). Bayesian posterior estimators, such as mean, mode, variance, and credible intervals, provide summary information about the data, and posterier distributions are examined for skewness, kurtosis, and modality, characteristics that illustrate the distribution of data points (Cogdon, 2006). Qualitative data collected as part of research using the BCSM are helpful in describing and explaining posterior distributions.

The concept of convergence is applicable to both case study methodology and Bayesian inference. Convergence refers to triangulation or agreement amongst data from different sources or methods (Patton, 2002). In Bayesian statistics, the variance of the posterior estimate and kurtosis or the peakedness of the posterior distribution curve indicates convergence. The peakedness of a posterior distribution curve refers to the height and narrowness of the curve (Congdon, 2006). A small variance and a tall and narrow distribution curve is evidence of similar data points or agreement between participants and data sources for the prior and data. A low and wide distribution curve indicates more variation between data points. A small variance and peaked posterior distribution is complementary to the concept of data saturation in qualitative research. Qualitative data reaches the point of saturation when no new data emerges (Kvale & Brinkmann, 2009). For example, there may come a point when no new data results from additional participants because themes are reoccurring. If saturation is quickly reached, then it is likely that the posterior distribution will also be peaked.

For my study I collected qualitative data using interviews and quantitative data using surveys. Qualitative and quantitative data were combined to richly describe healthcare service delivery from a variety of viewpoints and to assess convergence to

validate findings. I used Bayesian inference to combine interview and survey data for a prescribed approach to mixed-methods research. One of my research goals was to develop a formalized approach to mixed-method research. The flexibility of case studies and Bayesian statistics to use both qualitative and quantitative evidence helped achieve this goal.

Bayesian approaches to healthcare research. Spiegelhalter (2004) supported Bayesian approaches to healthcare research for several reasons. First, Bayesian methods allow for integrating multiple sources of evidence and viewpoints by drawing upon the background and knowledge of experts through the use of subjective priors (Spiegelhalter, 2004). For this reason, Bayesian statistics more transparently represents the viewpoint of the analyst than research using classical statistics. Second, Bayesian approaches are often less time consuming to implement than clinical trials but can incorporate existing clinical trial evidence in the prior (Spiegelhalter 2004). Third, Bayesian approaches better describe an outcome or phenomenon than tests of significance.

Sampling

The case. My study employed a single case design with purposive sampling for staff and random sampling for patients. An RWP-funded HIV clinic in a large city in the southeastern United States was the unit of analysis. I selected this clinic for several reasons. First, my case represented a typical or representative case based on data collected for a previous study (Beane et al., 2013). Yin (2009) described a typical case as one that is an exemplar of an average situation for the phenomenon of interest. My study focused on describing healthcare service delivery in a large, urban RWP clinic. Therefore, a populous clinic in a city center was appropriate. In an exploratory study,

Beane et al. (2013) found that several large, urban RWP clinics across the nation, including the unit of analysis for this study, had similar characteristics in terms of services offered, staff employed, and clients served. Results from this study may be comparable to case studies conducted at similar RWP clinics; however, results from this study would probably not be comparable to case studies conducted at smaller, rural RWP clinics.

The second reason I selected the specific unit of analysis is because of accessibility. Gaining access to an HIV clinic for research purposes requires sponsorship from the clinic's senior staff, such as the Chief Medical Officer, and approval from the clinic or hospital's research oversight board. My previous employer's professional ties with the clinic facilitated access and trust with staff participants.

Staff sampling. I used a purposive snowball sampling strategy to recruit clinic staff for interviews and surveys with a target sample size of 10 for interviews and 20 for surveys (Merriam, 2009; Schwandt, 2007). I started by sending an email to recruit a handful of staff that I knew qualified for the study. I requested that these staff send the recruitment email to other staff they knew to qualify based on length of time employed at the clinic and position. My previous employer had a professional affiliation with the clinic, but I did not supervise or have any influence on clinic staff; therefore, staff were not pressured to participate. Staff that qualified for the study directly provided services to patients and included physicians, physician assistants, nurses, dentists, case managers, and mental health or substance abuse counselors. I estimated that conducting interviews with these various job roles would provide information from a sufficient diversity of

viewpoints. Criteria for participation included service in an aforementioned role a minimum of one year to ensure adequate knowledge of site practices.

Staff recruitment took 7 weeks and was initially conducted via email as planned. Unfortunately, it was not possible to recruit the target staff sample size of 30 via three waves of emails. Based on a recommendation from the clinic's research oversight committee and their approval to do so, I printed the recruitment email and placed it in the mail boxes of staff at the clinic. Last, I left the printed email at a monthly staff meeting to be handed out at the end of the meeting. This resulted in 8 staff interview participants and 16 survey participants for a total staff sample size of 24. Interview participants received $20, and survey participants received $10.

Patient sampling. Thirty patients were recruited for 10 interviews and 20 surveys using random sampling. There were five physicians in the adult clinics at the site during the time of my study. A balanced sample was achieved by rotating physicians so that they recruited patients in the morning one day of the week and in the afternoon on another day of the week. Recruiting physicians gave every 3rd patient that qualified a study flyer. A total of six patients participated per day and the order of patients assigned to surveys and interviews was rotated. One physician was absent during the assigned recruitment time so a physician assistant assigned to that provider's patients conducted the recruiting. See Table 3 for a description of the sampling scheme.

Table 3

Patient Recruiting Schedule

Period	Monday	Tuesday	Wednesday	Thursday	Friday
	Doctor 1	Doctor 3	Doctor 5	Doctor 2	Doctor 4
am	1. Interview	7. Survey	13. Survey	19. Interview	25. Survey
	2. Survey	8. Survey	14. Interview	20. Survey	26. Survey
	3. Survey	9. Interview	15. Survey	21. Survey	27. Interview
	Doctor 2	Doctor 4	Doctor 1	Doctor 3	Doctor 5
pm	4. Survey	10. Interview	16. Survey	22. Survey	28. Interview
	5. Interview	11. Survey	17. Survey	23. Interview	29. Survey
	6. Survey	12. Survey	18. Interview	24. Survey	30. Survey

Physicians were instructed not to discuss the study with patients other than to inform them that their participation or decision not to participate would not influence the care they receive at the clinic. If patients had questions, they were instructed to call the number on the flyer. Patients eligible for participation included those 18 years of age or older who had received medical care at the clinic a minimum of one year.

Data Collection Methods

My study used two data collection methods: interviews and surveys. Two data collection methods allowed me to assess similarities between data collected using each method. Other data collection methods available to case study researchers such as observation, document review, archives, and artifacts were not used in this study due to time and resource limitations.

Interviews. Interviews with staff and patients illuminated the types of services available at the clinic and the extent to which services are accessible, ongoing, coordinated, and comprehensive. Interviews with staff were meaningful because they were better positioned to describe how care was coordinated from behind the scenes.

Specifically, staff were asked to describe the services that were delivered, how appointments were scheduled, which providers patients saw initially, and, upon the patient's returning to the clinic, how acute health needs were met, how chronic care was delivered, and which departments worked together most closely and how. A variety of staff were interviewed to represent care delivery from multiple perspectives. Interview data provided details about how services are delivered that surveys are unable to capture. Similarly, patients were interviewed about their experiences receiving care at the clinic with the focus on care delivery processes and not the patients' specific medical conditions. Staff and patients were interviewed individually and assured of confidentiality. Interview data were used to estimate priors for the Bayesian analysis.

Surveys. An independent sample of staff was asked to complete the Provider PCAT and respond to items categorized in the four domains of care that underlie medical home constructs: care accessibility, ongoing care, coordinated care, and comprehensive care. An independent sample of patients completed the Patient PCAT. PACT results served as the data in Bayesian analysis. PCAT data were analyzed after the interview data were analyzed and priors were estimated.

Trustworthiness

Trustworthiness was established in several ways. First, patient participants were randomly sampled from exam rooms. After patient visits, every third patient that qualified received a flyer with study information. Randomly selecting patients contributed to more trustworthy data than interviewing or surveying any patient that desired to participate. Randomly sampled patients that chose to participate were also assured that their decision to participate or not to participate would in no way influence

the medical care they received at the clinic and that their providers would not know if they participated or how they responded to interview or survey questions. Staff participants were sampled using a snowball sampling method and supervisors did not encourage or discourage staff to participate. Patients and staff were notified that participation was completely voluntary and that they were able to withdraw from the study at any time. Furthermore, the nominal incentive did not appear to influence participant's responses.

Research Questions

I developed and implemented the BCSM approach to describe if and how a RWP HIV clinic demonstrated care that aligned with the medical home model. I collected data from both patients and clinic staff using surveys and interviews. Through the creation of the BCSM for my study I developed a step-by-step research method that other researchers can apply. The development and implementation of the BCSM was the first research question for this study.

1. How can researchers use the BCSM to integrate qualitative and quantitative case study data? What are the research design considerations, strengths, and weaknesses of the BCSM approach to healthcare service delivery research?

This question addressed methodological issues associated with combining quantitative and qualitative data. In Chapter 4, I outline how to conduct the BCSM which is a formalized approach to mixed-method case study research by use of Bayesian statistics and subjective priors. I developed steps to the BCSM that other researchers may use and outlined my research steps for this study as an example of how the BCSM can be implemented.

For my study, priors were based on patient and staff subjective beliefs collected during interviews for patient and staff groups and for each medical home domain. For the Bayesian updating, I used a normal distribution and known variance, based on historical survey data, with the posterior of θ given by Equation 2. From the equation, θ is an unknown quantity of interest. The implicit sample size is represented by n_0, μ is the mean of the prior, m is the observed data sample size, and y_m is the observed data mean (Spiegelhalter, 2004).

$$p(\theta|y_m) = N\left[\theta\,\Big|\,\frac{n_0\,\mu + my_m}{n_0 + m}, \frac{\sigma^2}{n_o + m}\right] \tag{2}$$

In summary, the posterior distribution is normal and has a mean of $\frac{n_0\,\mu + my_m}{n_0 + m}$ and a variance of $\frac{\sigma^2}{n_o + m}$.

Next, I outline my case study proposition for the second, third, and fourth research questions that specifically pertain to medical home care in the RWP clinic. The clinic likely provides some but not all elements of medical home care in a way that attends to the needs of PLWH. This proposition focused my case study on data collection related to organizational processes to illuminate if and how the clinic delivered healthcare services that aligned with the medical home. I believed that some elements of the medical home model were practiced at the clinic.

My study described four medical home constructs: first contact accessibility, ongoing care, coordinated care, and comprehensive care. I addressed the following questions:

2. How and to what extent does the clinic provide medical home care according to
    patient and staff interviews? What prior mean scores are assigned to each medical
    home domain for patient and staff groups based on interview data?

This question addressed the mechanisms of healthcare service delivery from the points of view of patients and staff. Eight staff in various roles were recruited for interviews and participants were asked to describe a typical work day and procedures for delivering patient care. Ten patients were recruited for interviews and asked which services they received at the clinic and what the processes were for receiving those services. While the PCAT will capture specific ratings of healthcare service delivery, semi-structured interviews were conducted to obtain information that explains how and why or why not services are accessible, ongoing, coordinated, and comprehensive.

To analyze interview data, I used content analysis, which is a method of coding and categorizing text from interviews or other sources (Kvale & Brinkmann, 2009). Coding involves assigning key words to portions of text and may be concept or data driven. I primarily used concept-driven coding to assign priors based on primary care and medical home domains. Alternatively, data-driven coding is the process of assigning codes as the text are analyzed (Kvale & Brinkmann, 2009). I was open to additional codes, which were discovered during analysis and revealed information specific to healthcare delivery in HIV settings that I did not predefine. Using categorization, a method for limiting interview content to a few categories (Kvale & Brinkmann, 2009), I assessed the extent to which interview data confirmed or disconfirmed medical home practices at clinic. Categorization was guided by using PCAT item content. Specifically, I

used a method outlined in the next chapter to estimate patient and staff prior estimates for each domain.

3. What are the Johns Hopkins Primary Care Assessment Tool (PCAT) mean scores for each medical home domain for patient and staff groups?

This question captured information on patients' experiences receiving specific healthcare services at the clinic and if those services were accessible, ongoing, coordinated, and comprehensive. This question also assessed which services were available and how they were delivered at the clinic-based providers' experience delivering care. To answer this question, I administered the Provider PCAT to 16 staff and administered the Adult Patient PACT to 20 patients. Patient and Provider PCAT responses served as the data for the separate Bayesian analyses for each group and each medical home domain and subdomain. The PACT's domains of first contact accessibility, ongoing, coordinated, and comprehensive care align with the major tenets of the medical home model. Aggregate domain scores were calculated for each participant according the PCAT manual by summing Likert scales (Starfield & Shi, 2009). Means were then calculated for each domain. These means served as the data in the Bayesian analysis and in conjunction with the priors, resulted in posterior estimates.

4. What are patient and staff posterior means for each medical home domain? How do prior means influence posterior means? How do patient posterior means compare to staff posterior means?

This question addressed the combined impact of subjective priors and survey data on posterior estimates for constructs underlying medical home domains. Formula 2 above was used to calculate posterior estimates for each domain which reflected the both the

prior estimate and survey data. I assessed the influence of prior estimates by examining the mean scores from the survey data alone compared to the posterior estimates. Patient and staff posterior estimates for each domain were compared including a rank ordering of each domain. Last, a sensitivity analysis was conducted to test assumptions based on the weighting of the prior and data.

Participants

Patient survey participants. There were a total of 20 patient PCAT survey participants. The sample included 12 men and 8 women. Participants represented four race/ethnicities: African American (n = 16), White (n = 2), Hispanic (n = 1), and Native American (n = 1). Participant age ranges were 25-34 (n = 5), 35-44 (n = 5), 45-54 (n = 8), 55-64 (n = 1), and 65-74 (n = 1).

Patient interview participants. There were 10 patient interview participants. The sample included 6 men and 4 women. Interview participants were African American (n = 9) and White (n = 1). Participant age ranges were 25-34 (n = 2), 35-44 (n = 2), 45-54 (n = 4), 55-64 (n = 1), and 65-74 (n = 1).

Staff survey participants. There were 16 staff PCAT survey participants and the sample included 11 women and 5 men. Interview participants were White (n = 8), Asian (n = 4), and African American (n = 4). One participant was of Hispanic, Latino, or Spanish origin. Participant age ranges were 25-34 (n = 1), 35-44 (n = 8), 45-54 (n = 5), and 55-64 (n = 2). Participants included a dental professional, a social worker, a case manager, a mental health professional, a physician assistant, two staff that identified as other professionals, two nurses, three advanced practice nurses, and four physicians.

Staff interview participants. There were 8 staff interview participants. The sample included 7 women and 1 man. Interview participants were White (n = 4), Asian (n = 3), and African American (n = 1). Participant age ranges were 25-34 (n = 1), 35-44 (n = 5), and 45-54 (n = 2). Participants included a clinical pharmacist, a housing coordinator, a nurse educator, two advanced practice nurses, and three physicians. Participants had worked at the clinic either 3-5 years (n = 2), 6-10 years (n = 4), 11-15 years (n = 1), or 21-25 years (n = 1).

Instruments

Primary Care Assessment Tool. The PCAT is a survey developed by the Johns Hopkins Primary Care Policy Center for Underserved Populations that assesses nine domains and subdomains that align with primary care (Starfield & Shi, 2009). The medical home is an approach for delivering primary care and four of the PCAT domains directly align with medical home principles (Association of American Medical Colleges, 2009). The PCAT has been widely used both domestically and internationally to assess the adequacy of primary care constructs (Haggerty, Pineault, Beaulieu, Brunelle, Gauthier, Goulet, & Rodrigue, 2007; Macinko, Almeida, & Klingelhoefer, 2007; Pongpirul, Starfield, Srivanichakorn, & Pannarunothai, 2009; Shi, Starfield, Jiahong, Politzer, & Regan, 2003). Malouin et al. (2009) reviewed several instruments and found the PCAT to be the most comprehensive tool for assessing medical home care delivery. An advantage of the PCAT is that both provider and patient versions are available, which allows for comparing responses from those delivering and receiving services (Starfield & Shi, 2009). I used both versions of the tool for my study.

The principal domains of the PCAT are first-contact accessibility, ongoing care, coordinated care, and comprehensive care (Starfield & Shi, 2009). These domains directly align with the medical home model. The secondary domains are family-centered, community-oriented, and culturally competent care. A 4-point scale (1 = *definitely not*, 2 = *probably not*, 3 = *probably*, 4 = *definitely*) is used to measure how likely a respondent is to receive specific healthcare services at his or her place of primary care.

The PCAT's content has been extensively assessed (Malouin et al., 2009). Content area experts reviewed and determined items for inclusion in the survey. Shi et al. (2001) assessed the PCAT's psychometric properties to determine item factor loadings, item-convergent validity, item-discriminant validity, equal-item variance, equal item-scale correlation, and score reliability. The factor analysis supported dropping several items from the instrument, and measures of validity and reliability on the revised version were sufficiently higher than that of the initial scale. The revised tool met all assumptions required for summing items ratings in each domain for summated Likert scales without weighting. In the PCAT manual, Shi et al. (2001) outlined the method for calculating domain scores based on the summated Likert scales.

The PCAT measures first contact access, ongoing care, coordinated care, and continuous care. First-contact access means that care is first sought from the primary care provider when a new health or medical need arises (Starfield & Shi, 2009). The primary care provider serves as the usual entry point into the healthcare system for each health-care need except in the case of serious emergencies. The primary care provider either provides care directly or serves as a facilitator directing patients to more appropriate sources of care. Service accessibility and utilization are two sub-domains within first-

contact care. Accessibility refers to how easily patients can obtain appointments with providers when needed and utilization indicates how often services are used.

Ongoing or continuous care refers to the longitudinal use of a regular source of care over time regardless of the presence or absence of disease or injury (Starfield & Shi, 2009). The focus here is on the creation of a medical or healthcare home recognized by both the patient and the provider.

Coordinated care involves linking patients to services so that patients receive appropriate care for all of their health problems, physical as well as mental (Starfield & Shi, 2009). Care coordination includes making appointments, discussing patient care with other providers, and following up with patients about services provided. Coordinated information systems is sub-domain of coordinated care and pertains to patients access to medical records and provider use of the medical record to coordinate care.

Comprehensive care refers to the availability of a wide range of services in primary care and across the entire spectrum of healthcare needs. Service types available and service types provided are the two sub-domains within comprehensive care (Starfield & Shi, 2009).

Interview script. I developed the script used for interviews with clinic staff and patients. (See the Appendices A and B). The scripts were developed to align with medical home constructs and four domains of the PCAT. Interview questions directly relate to the individual participant's role in the clinic. Some questions are very specific and seek exact information while other questions focus on the participants' experiences at the clinic. Kvale and Brinkmann (2009) described two types of interview questions. Factual questions ensure specific data are collected. Questions directed at the participant's

experience give the participant the opportunity to provide information the script does not specifically address which may uncover important themes or issues.

Medical home terminology was not used during the interviews for two reasons. First, medical home terms may have biased or pressured participants to describe healthcare service delivery as a medical home. The use of medical home terminology may have led participants to believe medical home practices should be in place and biased participants to describe a medical home. Secondly, medical home terms may be unknown to some interviewees or may have a negative connotation. Rather, questions focused on engaging participants in a discussion about how healthcare services are delivered and concentrate on the participant's experience working in or receiving services in the clinic to healthcare service delivery.

Procedures

Procedures for staff participants. Interview and Provider PCAT data were collected from staff. Staff participants were recruited via email and then the printed email was placed in mailboxes at the clinic and handed out at staff meetings. Staff were asked to forward the email to other staff who qualified and most participants were recruited via these forwarded emails. Staff were asked to participate in a voluntary 1-hour semi-structured interview or to complete an online survey exploring care delivery processes at the clinic and participant's job roles. Every third eligible participant was assigned to participate in an interview and other participants were assigned to the survey. Eligible staff included physicians, physician assistants, nurses, case managers, and mental health or substance abuse counselors who had been employed at the clinic for at least 1 year.

Staff surveys. Participants assigned to the survey received an email link to the online Provider PCAT. The survey included a consent portion prior to the first question and participants then proceeded to the first question which indicated consent. No personal identifying information was requested on the survey. The survey took 20-25 minutes to complete and staff completed the survey at their convenience. Staff survey participants received a $10 gift card for participating in a survey.

Staff interviews. Written consent was obtained from staff interview participants. Participants received a copy of the consent form for their records. Interviews were scheduled during a time convenient for participants at their place of employment in a private reserved conference room, office, or exam room. Interviews took 45-60 minutes and were recorded with the consent of participants and were later transcribed. No personal identifying information was recorded during interviews. Staff received $20 for participating in an interview.

Procedures for patient participants. Over a 1-week period, physicians in the adult clinics, the men's and women's clinic, referred every third eligible patient for an interview or survey by giving them a flyer with the study information. Flyers are commonly used for study recruitment at the clinic. Clinicians were instructed not to discuss the study with patients other than to inform them that their participation or decision not to participate would not influence the care they receive at the clinic. If patients had questions they were instructed to call the number on the flyer. A detailed sampling and recruitment scheme is detailed in Table 3. Patients eligible for participation included those 18 years of age or older who had received medical care at the clinic a minimum of one year.

Patient surveys. Surveys took place in a reserved conference room or an office in the clinic after the patient's medical visit so as to not disturb patient care. Patient participants assigned to the Patient PCAT were read the survey questions aloud and their verbal responses were recorded. The survey was read aloud to account for different reading levels amongst patients. The survey included a consent portion prior to the first question and all patients agreed to participate and proceeded to the first question which indicated consent. No personal identifying information was requested on the surveys. The surveys took 20-26 minutes to complete. Patient participants received $10 for participating in a survey.

Patient interviews. Interviews took place in a reserved conference room or office in the clinic after the patient's medical visit so as to not disturb patient care. Consent forms were read aloud to each participant, and they were provided with a copy to take home and encouraged to ask questions about the study. Participants then signed the consent form. Interviews took 40-55 minutes and were recorded with the consent of participants and later transcribed. No personal identifying information was recorded during interviews. Participants received $20 for participating in an interview.

Protection of participant data and ethical considerations. No personal identifying information was collected on surveys from patients or staffs. Demographic information was reported for the group but not individually. This study focused on processes for adult HIV care delivery so these data were not needed and only served to potentially identify the participant. A waiver of written consent was granted from the Institutional Review Board for patient and staff surveys since no identifying information was collected as part of the survey, the survey presented no more than minimal risk, and

written consent would have been the only record linking the participant and the research which potentially risked breach of confidentiality.

Written consent was obtained from patient and staff interview participants. Interview participants were asked to refrain from using their own name or the name of other staff or providers during interviews. Any names accidentally mentioned during interviews were not included in transcriptions. No personal identifying information was requested during interviews. However, voices and information contained in the recordings may have potentially identified patient or staff participants. Consent forms are stored separately from interview recordings in a locked filing cabinet in the researcher's office. Interview recordings were immediately transferred to the researcher's firewall and password protected computer. Interview recordings will be permanently deleted after 2 years.

Written reports and publications do not identify the clinic, city, or state where the research is conducted. The clinic is referred to as a RWP funded clinic in a southeastern city. Any other information that would uniquely identify the clinic from other RWP clinics in the southeastern United States is not mentioned in reports or publications. Also, any staff information, such as official title indicative beyond the participant's role as a clinician or allied health professional, is not reported with specific survey responses or survey quotes. For example, physicians, physician assistants, and nurses are referred to as clinicians in reports to provide greater anonymity. Substance abuse or mental health counselors and case managers are referred to as allied health professionals in reports to provide greater anonymity. Individual comments in reports are not associated with race/ethnicity, age, or sex of the participant.

CHAPTER 4

RESULTS

The overall objective of this research was to describe healthcare delivery, in the context of the medical home model, at a RWP-funded HIV clinic. Interviews and surveys were conducted with patients and staff members at the clinic to create a comprehensive picture of healthcare delivery from the points of view of those who deliver and receive services. Qualitative data were collected in the form of one-on-one interviews with patients and staff at the clinic, and prior mean scores for the Bayesian analysis were estimated based on the qualitative interview data. Quantitative data were collected in the form of PCAT surveys with patients and staff and are used as the data in the Bayesian analysis.

This chapter outlines the results for each research question in this study. The first research question, which is methodological, addresses the process and considerations for conducting a BCSM to combine qualitative and quantitative case study data. I describe the BCSM process as other researchers may use it and provide examples from this study to illustrate the steps. For research questions 2, 3, and 4 results from interviews, surveys, and the Bayesian analysis are described separately and organized according to each medical home domain to describe medical home characteristics of the case.

Research Question 1

My first research question was the following: *How can researchers use the BCSM to integrate qualitative and quantitative case study data? What are the research design considerations, strengths, and weaknesses of the BCSM approach to healthcare service delivery research?*

In this dissertation, I developed a novel approach to mixed-methods research. I developed and tested the BCSM to describe healthcare service delivery alignment with the medical home model at a RWP-funded HIV Clinic. Below, I describe the steps to the BSCM and provide an illustration of the process in Figure 1 so that other researchers may use it in practice. For each step I provide the specific processes used for my research as an example of how to implement the BCSM.

Step one. Step one of the BCSM is to state the research questions. Questions that are relevant to a BCSM design are primarily questions of "how?" or "why?" The primary goal of qualitative research, including case studies, is to describe a situation, culture, behavior, phenomenon, or system and answer questions such as "how" or "why" (Merriam, 2009). Research questions for this study are described in detail in Chapter 3. Research questions should be defined before the study methodology is selected. The primary research questions for this study are listed below. Question 2 refers to the qualitative data that were collected to describe how and the extent to which the clinic provides medical home care from the point of view of patients and staff. Question 2 also refers to estimation of subjective priors, based on interview data, for the Bayesian analysis. Question 3 refers to the quantitative data collected for the Bayesian analysis. Quantitative data were collected using the PCAT survey, which is a tool for measuring
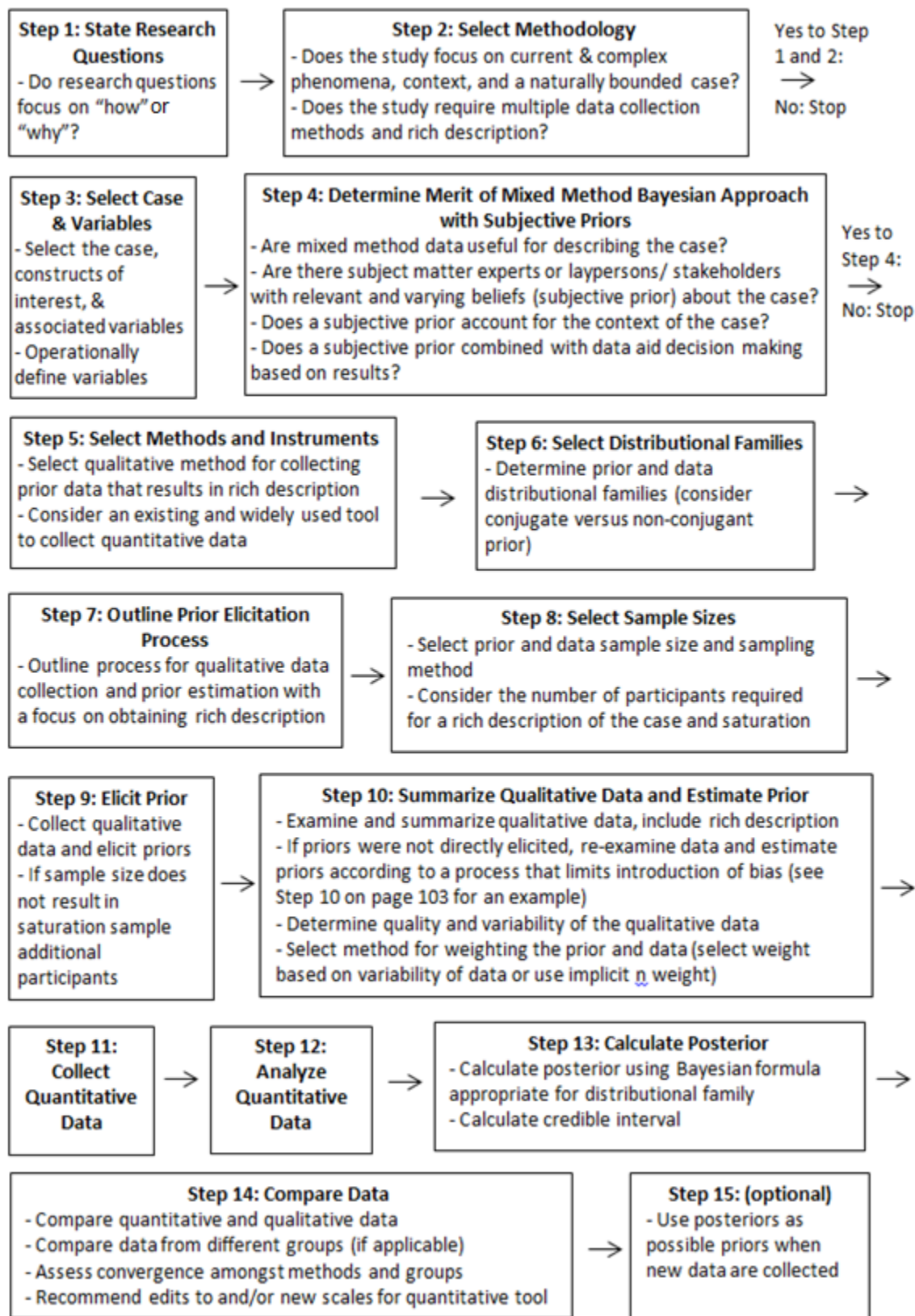
Figure 1. Bayesian Case Study Method: 15 Step Process.

medical home constructs (Shi et al., 2001). Finally, question 4 refers to the calculated posteriors based on the combination of qualitative and quantitative data.

2. How and to what extent does the clinic provide medical home care according to patient and staff interviews? What are the prior mean scores are assigned to each medical home domain for patient and staff groups based on interview data?

3. What are the Johns Hopkins Primary Care Assessment Tool (PCAT) mean scores for each medical home domain for patient and staff groups?

4. What are patient and staff posterior means for each medical home domain? How do prior means influence posterior means? How do patients' posterior means compare to staff posterior means?

Step two. Step two is to determine the most appropriate methodology for answering the research questions. I selected case study methodology because the goal of this dissertation was to describe the current state of healthcare service delivery in a clinic setting which is a bounded system. Stake (1995) stated that case studies should consider a unit of analysis that is naturally bounded to focus and direct the research questions and data collection within the case boundaries. A case can be an individual, group, or organization (Yin, 2009). For my study, the clinic provided a natural boundary and I limited my data collection to services delivered or coordinated within the clinic. Case studies focus on current and complex phenomena and context is extremely important to understanding the case (Yin, 2009). Anaf et al. (2007) specifically recommended case study methodology for examining healthcare delivery within a systems theory framework; healthcare systems are complex systems that adjust and modify processes to respond to a variety of changing conditions, such as political climate and disease

outbreak. Case study methodology is fitting for understanding those processes because cases studies focus on current behaviors, procedures, and interactions instead of manipulating variables (Yin, 2009). For my study, the research questions could not be answered by examining one variable or by manipulating variables because healthcare delivery is not a phenomenon that occurs in a vacuum; rather, healthcare delivery is deeply rooted in context. Perhaps most importantly, case study methodology is a flexible yet rigorous research approach. The variety of methods available in case study design makes it a fitting methodology for conducting mixed-method research. Case studies should be planned in great detail with attention to selecting methods that best answer research questions, establishing chains of evidence, and assessing the convergence of data collected using different methods to judge the study's construct validity (Yin, 2009). Ultimately, a case study should present empirical evidence describing the case. A major benefit of case study methodology is that it results in a rich description of the case which can provide insight that may be otherwise overlooked. My rationale for selecting a case study is further detailed in Chapter 3. According to Yin (2009), researchers considering a case study should attend to these questions:

1. Does the study focus on current and complex phenomena?

2. Does the study focus on a case, or unit of analysis, with natural boundaries?

3. Is context important for describing and understanding the case?

4. Does the study seek to describe phenomena and not to manipulate variables?

5. Does the study seek to present a rich description of the case?

Step three. Step three is to select the case, determine the specific variables associated with the constructs in the research questions, and to operationally define

variables. This study focused on the medical home model in a RWP clinic. I selected the specific clinic because it is a typical case representative of large RWP clinics in metropolitan areas (Beane et al., 2013). The variables and underlying constructs I focused on are defined in the literature as primary medical home model principles: first contact access, ongoing care, coordinated care, and comprehensive care (AAMC, 2008; Stange et al., 2010). Operational definitions were based on NQCA primary care medical home certification standards and PCAT survey item content (NQCA, 2014; Starfield and Shi, 2009). Operational definitions for variables in this study are outlined in Chapter 3.

Step four. Step four is to determine the merit of a mixed-method Bayesian approach, with a subjective prior, for a case study. It is pertinent to first determine the research questions, methodological framework, constructs, and variables to ensure that the focus of the study aligns with the BCSM. Questions researchers should consider at this step are listed below with an explanation of how I answered them in regard to this study.

1. Does a mixed-method approach strengthen the research design and best answer research questions to richly describe the case?

I selected a mixed-method approach because qualitative and quantitative data provided more information than one method alone. Conducting qualitative interviews allowed for more flexible data collection and therefore very likely more comprehensive data than solely relying on quantitative data. Interviews allowed me to collect data that richly described medical home practices in a RWP setting. Furthermore, the qualitative data explained some aspects of the medical home in the clinic that PCAT survey items did not address. For example, I learned during interviews that the clinic provides services

that are not addressed by the PCAT. The interview data also helped explain the quantitative data. For example, the PCAT domain of information systems coordination was associated with a low mean score, a result that was explained by interview data that revealed that patients do not have internet access at home to use the online patient portal. Last, the quantitative data increased the rigor of my study because the PCAT was designed for measuring medical home characteristics (Shi et al., 2001).

2. Are there subject matter experts or laypersons such as stakeholders who can uniquely contribute information to answer research questions?

Non-statisticians can contribute useful information to a study in the form of an elicited prior (Gill & Walker 2004; Press, 2002; Smith, 2010). For this study, clinic staff were an expert source of information on healthcare delivery processes. Patients, as recipients of healthcare services, were stakeholders with valuable information to contribute. Collecting data from patients and staff was important because both groups had relevant knowledge that described healthcare delivery processes at the clinic. Comparing information from these groups was also helpful for drawing further conclusions about healthcare delivery at the clinic. For instance, when patients' experiences receiving healthcare services were different from how staff intended services to be delivered, that indicated a process or communication breakdown for that medical home domain. Collecting data from both patients and staff resulted in a richer description of healthcare delivery processes at the clinic than data from either group alone would have.

3. Does the research topic align with tenets of subjective probability and epistemic uncertainty? For example, is it reasonable that subject matter experts or stakeholders may have varying degrees of belief?

The basis of subjective probability and subjective priors in Bayesian analysis is that groups may have varying degrees of belief, or epistemic uncertainty, about the phenomenon (Gill & Walker, 2005; O'Hagen, 2004). A subjective prior based on patient experience and belief was relevant for my study because of the influence of patient perception on individual health goals and outcomes (Sullivan, 2003). Furthermore, patients are the direct recipients of healthcare services and therefore the most important stakeholders. Similarly, a subjective prior based on staff belief was fitting because staff were the experts on behind the scenes processes and procedures in the clinic that may not have been readily apparent to patients. It was reasonable that individuals may have had varying degrees of belief around how likely services were to have been delivered or coordinated because of different experiences providing and receiving services. In summary, not all staff had the same experience providing services and not all patients will had the same experience receiving services.

4. Does a subjective prior help account for the context of the case?

Context is a major focus of case study methodology (Yin, 2009). In healthcare evaluation, context is hardly distinguishable from healthcare delivery. In the BCSM, a subjective prior is the mechanism for accounting for context in the posterior estimate because the quantitative data are unable to do so. Speiglehalter et al. (2004) noted that Bayesian inference explicitly acknowledges context, which is important to healthcare evaluation, because context can cause different stakeholders to view evidence in different ways. In my study, I accounted for context by obtaining qualitative descriptions from patients and staff that addressed the influence of a variety of factors on healthcare delivery. For example, patients described how previous experiences within healthcare

settings influenced their perception of services in the clinic. Staff discussed how patients had needs, such as housing, that had to be met before health could even be addressed. Because I estimated priors based on qualitative data that included a description of context, the priors implicitly incorporated context.

Step five. Step five is to choose the data collection methods and instruments. Data collection methods and tools should be selected to best answer the research questions and to reflect a subjective prior based on expert and/or stakeholder belief. Prior data collection methods that include directly eliciting the prior should also include a qualitative description explaining why the prior was assigned (Press, 2002). Alternatively, the prior may be estimated based on qualitative data collected. Both methods should include collecting a rich description of the case. Researchers should consider using a widely used tool to collect the quantitative data to strengthen the overall research design. For my study, I used semi-structured interviews to collect qualitative data and surveys to collect quantitative data. I selected the PCAT survey because it was developed to assess medical home characteristics of healthcare settings (Malouin et al., 2009). Furthermore, there are patient and staff versions of the PCAT so that results from each group can be compared (Starfield & Shi, 2009). I chose semi-structured interviews to gain detailed and nuanced information that would provide a rich description of health-care delivery at the clinic. Semi-structured interviews encourage participants to describe the case from the individual's point of view, provide the researcher the opportunity to ask follow-up questions for clarification, and are flexible enough that participants are able to provide unexpected but relevant information (Schwandt, 2007).

Step six. Step six is to determine the prior and data distributional families. My study data were the PCAT survey results. The PCAT manual outlines the method for calculating domain scores based on summated Likert scales (Starfield & Shi, 2009). Shi et al. (2001) assessed the PCAT and found that it met all assumptions required for summing item ratings in each domain without weighting. Summated Likert scales are less prone to measurement error than individual Likert items because multiple items comprise the scale (Spector, 1992). Summated Likert scales are typically treated as normally distributed data and I used the Shapiro Wilkes test to confirm that data were normally distributed.

With normally distributed data, I next considered if my prior would be conjugate or nonconjugate. Conjugate priors are from the same distributional family as the data and are more computationally efficient than nonconjugate priors from different distributional families (Ntzoufras, 2009). I decided that the priors, which I estimated from interview data, would have a conjugate normal distribution.

Step seven. Step seven is to determine the method for eliciting and estimating the subjective prior. Prior elicitation is a process used to draw probability distributions from information provided by subject matter experts. Non-statisticians can contribute useful information in the form of an elicited prior (Gill & Walker 2004; Press, 2002; Smith, 2010). Press (2003) emphasized that subjective priors are informed and introduce a degree of personal interpretation. However, a subjective prior is not a license to assign an estimate haphazardly. Smith (2010) asserted that an expert's subjective prior must reflect the expert's degree of belief and appear possible, logical, and reasonable to an outsider. Priors that are elicited from experts in a systematic manner can contribute valuable

information otherwise lost using purely quantitative methods or uninformed priors (Gill & Walker 2004; Press, 2002; Smith, 2010).

One method of prior elicitation involves structured interviews in which the researcher presents scenarios and the expert provides his or her belief about the probability of an event by assigning a probability or value. This method involves training the expert and assessing the reliability of the expert's prior assignments; qualitative descriptions should be obtained along with the estimate (Gill & Walker 2004; Press, 2002; Smith, 2010).

Another method of eliciting priors is to collect qualitative data which the researcher then uses to estimate the prior. Either method of eliciting priors should focus on obtaining rich description from participants. I chose to use latter method, by conducting interviews because of concerns over training patients and staff to assign prior values. Time that would have been spent training patients and staff was better used listening to descriptions of care provision and receipt. Patients would have required significant training and limited education levels were a concern. Staff had extremely limited time to participate.

To elicit priors for my study I developed semi-structured interview scripts to use with patients and staff. In developing the interview script, I referred to the PCAT survey to ensure I collected data that reflected the medical home domains captured in the survey because I planned to assign a prior to each survey item. However, I did not directly ask the same survey questions. Instead I focused on open-ended questions that addressed the medical home domains but also gave the participant an opportunity provide rich description of his or her experience providing or receiving healthcare services. Also, I

posed interview questions in a way that elicited a story from the interviewee. For example, I asked patients to describe what first brought them to the clinic and what their first experience at the clinic was like (See Appendices A & B for interview scripts).

Step eight. Step eight is to determine the sample size and sampling method for the prior and the data. The number of participants sampled should be adequate to describe the case, achieve saturation, and obtain enough qualitative data from multiple participants for a rich description. Participants should not be resampled from prior for the data because Bayes' Theorem assumes prior and data independence (Speiglehalter, 2004). Furthermore, prior and data samples should be independent because using the same sample for the prior and data results in less overall information (Ross, 1996). For this reason I sampled two groups of patients and two groups of staff and used different samples from each group.

Selecting a unit of analysis for a case study is seldom done through random sampling because the case typically has specific characteristics that drive the case study; however, the participants at the case study site may be randomly sampled. Patients were recruited according to a random sampling scheme over the course of one week. Ten patients were recruited for interviews and 20 patients were recruited for surveys. Staff were recruited via snowball sampling and were initially conducted via email as planned. It was not possible to recruit the target staff sample size via three waves of emails. On the advisement of the clinic's research oversight committee, I printed the recruitment email and placed it in staff mailboxes at the clinic and had it distributed at a monthly staff meeting. This resulted in 8 interview participants and 16 survey participants for a total of 24 staff participants out of a target sample size of 30 staff.

Step nine. Step nine is to directly elicit the prior along with a qualitative description of the prior estimate or to collect the qualitative data that will be used to estimate the prior. Quantitative and qualitative data may be collected concurrently. However, the prior must be estimated without knowledge of the quantitative data. If the qualitative data do not result in saturation then additional participants should be sampled. For my study, I conducted semi-structured interviews with 10 patients and 8 staff, as described in Chapter 3.

Step ten. Step ten is to examine the qualitative data and estimate the priors if priors were not directly elicited. I outline the process used for my study to limit biases in assigning subjective priors, something Press (2003) warns against.

Because I sought to estimate priors based on the PCAT items that address medical home domains, I decided to primarily use concept-driven content analysis (Kvale & Brinkmann, 2009) to analyze the interview data. This entailed analyzing the interview data according to each medical home domain: first contact utilization and access, ongoing care, coordinated services and information systems, and comprehensiveness of services available and provided. I first analyzed each interview transcript for mentions of the provided or coordinated service according to services addressed in each PCAT item.

Next, I used data driven coding (Kvale & Brinkmann, 2009) to look for indicators of services and processes that may align with medical home principles but are not specifically addressed in the PCAT. For example, patient education sessions, food pantry, and childcare services are not addressed in PCAT items but are indicative of comprehensive service provision.

I tallied references to services and also analyzed transcripts for mentions of the degree to which the service was likely to be provided such as "always," "sometimes," "occasionally," or "never." Data driven coding also resulted in a summary of patient perceptions of the clinic.

After analyzing each interview transcript, I assigned a score to each PCAT item for that individual's interview. I used the PCAT's four point Likert scale (1 = definitely not, 2 = probably not, 3 = probably, 4 = definitely) to assign scores as to how likely the clinic was to have provided or coordinated certain services. After assigning scores to each PCAT item for each interview participant, I used the PCAT manual's method of calculating summated Likert scales (Starfield & Shi, 2009) to obtain domain scores for each participant. Participant domain scores, based on the summated Likert scale, were then averaged to obtain overall prior mean scores for each domain. The process of assigning priors is described in detail in the steps below.

1. I transcribed each interview transcript and made notes about participant tone and if the participants sounded excited, angry, frustrated, or neutral.

2. For the content driven analysis, I created folders for each medical home domain. For the data driven analysis, I created a miscellaneous folder for a separate analysis later.

3. I examined each interview and filed quotes that addressed medical home domains in the appropriate folder and included a participant number next to each quote.

4. Interview quotes that were not relevant to medical home domains and PCAT items were filed in the miscellaneous folder.

5. I created an Excel workbook with a worksheet for each medical home domain. In each worksheet there was a column for each interview participant and a row for each PCAT survey item under that domain.

6. I examined quotes in medical home domain folders for the specific services or experiences mentioned in each PCAT survey item under that domain. In each medical home domain worksheet, I marked an x in each cell where the PCAT item and participant number coincided, indicating a participant mentioned the service.

7. In cells where there was an x was marked, indicating the service was mentioned, I examined quotes in the medical home domain folders for mentions of how often the service was provided, such as "always," "sometimes," or "never" and assigned a score of 1 to 4 (corresponding to PCAT scores; see above) indicating how likely the participant was to have provided or received the service. I also looked for descriptions of negative, neutral, or positive experiences to assist in assigning a score of 1 to 4. For example, a patient mentioned a provider was like a mother to him; therefore, I assigned a score of 4 or "definitely" that the provider knew the patient as a person and not someone with a medical issue.

8. Each x was replaced with a score of 1 to 4.

9. During steps 5 and 6, I also paid attention to how truthful I felt the interview participant was or if he or she was attempting to satisfy me in my role as the interviewer. Although it is possible that participants wanted to please me or may have exaggerated unpleasant experiences, I did not perceive participants

to be untruthful or to have provided descriptions skewed enough to change ratings from what the transcript content suggested.

10. Blank cells in medical home domain worksheets indicated the service was not mentioned at all and a score of 1 or "definitely not" was assigned.

11. Next, I used the PCAT manual's method of summated Likert scales to obtain a domain score for each interview participant. Domain scores were then averaged across participants to obtain an overall prior mean score for each domain.

These 11 steps were used to estimate the prior mean score for each medical home domain. Appendix E contains a screenshot of the Excel spreadsheet for one domain's prior and provides an example of the prior assignment process for this study. For my study, the PCAT survey's content and Likert scale provided a framework for assigning priors. Researchers using the BCSM should bear in mind that case studies that do not collect quantitative data using a survey will have a very different method for assigning priors.

Press (2002) emphasized that subjective priors incorporate informed prior belief about the phenomenon that contributes relevant additional information to the study. In the BCSM the qualitative data should also be analyzed for themes and meaning beyond those directly related to the priors. For my study, this was useful for understanding patient's perceptions of the clinic and how the clinic provided a much needed support system for some patients. I also gained an understanding of why staff went into HIV care and how they perceive their role as a provider.

Steps eleven and twelve. Steps eleven and twelve are to collect and analyze the quantitative data. I collected 20 PCAT surveys, over the course of one week, from patients in-person by reading the survey questions out loud and recording responses. I collected 16 PCAT surveys from staff over the course of seven weeks via an online survey. PCAT surveys were scored and summated Likert scale scores were calculated for each participant according to the PCAT manual (Starfield & Shi, 2009). Next, participant domain scores were averaged to obtain mean scores for each domain (Starfield & Shi, 2009).

Step thirteen. Step thirteen is to calculate the posterior. Formulas used to calculate the posterior should represent the appropriate distributional family. For the normal distribution, the implicit sample size is represented by n_0, μ is the mean of the prior, *m* is the observed data sample size, and y_m is the observed data mean. Equation 2 presents the posterior formula for the normal distribution (Spiegelhalter, 2004).

$$p(\theta|y_m) = N\left[\theta \Big| \frac{n_0\mu + my_m}{n_0 + m}, \frac{\sigma^2}{n_o + m}\right] \tag{2}$$

In summary, the posterior distribution is normal and has a mean of $\frac{n_0\mu + my_m}{n_0 + m}$ and a variance of $\frac{\sigma^2}{n_o + m}$. The last portion of this step is to calculate the credible interval for the posterior mean. The credible interval for the posterior is shown in Equation 3 (Spiegelhalter, 2004).

$$C.I. = \bar{y} \pm 1.96 \times \frac{\sigma}{\sqrt{n_0 + m}} \tag{3}$$

As a side note regarding weighting the prior, Equation 2 represents my use of the calculated implicit sample size (n_o) to weight the prior and the data in the posterior. The

implicit sample size (n_0) is based on the population and prior variance. The population variance was obtained from historical surveys collected at the clinic for a previous study and the prior variance was calculated from the PCAT item scores assigned to individual participant's interview data. I could have selected an alternative approach and assigned a subjective sample size to the prior which was the approach used by Ogletree (2009). Specifically, I could have assessed the variability of the interview data and used this to weight the prior less than, equally to, or higher than the data. The more variable the interview data, the less certainty and therefore a lower weight would have been assigned to the prior compared to the data. However, I used the implicit sample size (n_0) which I viewed as a more objective approach to weighting the prior and the data in the posterior.

Step fourteen. Step fourteen is to compare the qualitative and quantitative data. This step is crucial because the qualitative may support, contrast with, or explain the quantitative data. In my study, the interview data was also useful for explaining the low patient Information Systems Coordination domain mean score. Specifically, the interview data revealed that while patients had access to an online patient portal that contained his or her medical record information, lack of internet access at home rendered patients unable to use the portal.

The qualitative data may offer insights into the quantitative instrument that can be used to improve the instrument. For example, in my study the interview data revealed that the PCAT survey had minor limitations in assessing medical home delivery in the RWP clinic. Specifically, the PCAT did not address all of the services offered at the clinic. Furthermore, the terminology used in the PCAT may have been unfamiliar to patients

with low health literacy levels; in turn these issues may have lowered some PCAT domain scores.

Step fifteen. Step fifteen is applicable once further data are collected for additional phases of the study or for other case studies examining the same type of case. This is done by using the existing posterior as the prior for the new study. This prior is then combined with new data for an updated posterior.

Bayesian updating benefits. There are general benefits to using Bayesian statistics over frequentist statistics that also apply to the BCSM. For example, instead of tests of significance, the posterior is the final product used to drive the decision-making process in Bayesian inference. The posterior provides more information than a simple yes-or-no decision based on a *p*-value, which encourages binary thinking. Speiglehalter et al. (2004) stated that posterior estimates are more inferential and, therefore, better aids to the decision-making process.

Furthermore, Bayesian statistics allow for updating data based on actual occurrences as opposed to possibilities of occurrences or long-run frequencies (Bolstad, 2007). In this way, Bayesians are able to learn from data and change epistemic uncertainties. Epistemic uncertainty represents our knowledge or degree of belief around the parameter of interest. As the amount of information we have increases, our epistemic uncertainty decreases (O'Hagen, 2004). Bayesians are also able to change epistemic uncertainty by using an existing posterior as a prior in a new Bayesian analysis when additional data are collected; this results in a new posterior and decreased epistemic uncertainty.

Small sample size benefits. Another benefit of the BCSM is that Bayesian statistics are well positioned to deal with small sample sizes because of the use of probability distributions rather than *p*-values, which are influenced by sample size. This is important because priors based on qualitative data may be a barrier to collecting data from a large sample of participants. Furthermore, the outcome of Bayesian analysis is that it is not influenced by extremely large sample sizes that often result in significant *p*-values regardless of the effect size (Carver, 1993). Last, the BCSM allows the researcher to weight the subjective prior equally to or higher than the data if doing so is justified. This weight conveys the extent to which the researcher believes the data represent the sample (Bolstad, 2007). Using this method, the prior may be assigned as much weight as the data even if the prior sample is small.

Subjective prior and qualitative data benefits. A primary strength of the BCSM is that subjective priors allow for combining qualitative and quantitative data for a posterior estimate. Bayesian analysis that uses subjective priors can describe a case from multiple viewpoints and include the beliefs of experts and layperson stakeholders. This results in a more comprehensive description of the case. Speiglehalter et al. (2004) emphasized that Bayesian inference incorporates multiple sources of evidence and that it is especially well suited to healthcare evaluation because a subjective prior can account for context in ways that other statistical techniques cannot. Context is a cornerstone of case study methodology. Furthermore, in using a subjective prior, opinion can be explicitly modelled (Speiglehalter et al., 2004). In the case of healthcare delivery, patient opinion is especially relevant, and, even if a patient's experience with healthcare delivery is biased, researchers should account for it in the posterior because of the strong

relationship between a patient's perceived well-being, beliefs, and actual health outcomes (Sullivan , 2003).

Another strength of the BCSM is that qualitative data may reveal information a quantitative method alone would not. For example, in my research, the interviews revealed that the PCAT did not fully address care comprehensiveness at the clinic, which is useful information for other researchers that may use the PCAT in HIV settings. Like most quantitative tools, the PCAT only captures what it measures. If used alone, the PCAT results would have inaccurately reflected medical home care at the clinic; however, the inclusion of a subjective prior contributed to the posterior estimate, which was a more accurate picture of medical home care at the clinic.

Benefit of careful attention to conceptual details. A BCSM requires careful conceptual planning to collect prior data that meaningfully reflect the constructs of interest. It is not enough to ask participants providing prior data what they think of construct of interest. Rather, careful attention must be paid to ask questions that capture the construct and contextual information important to the case without leading participants. In designing data collection tools for a BCSM, the researcher has to undergo more conceptual planning than other research designs, which leads to a more nuanced examination of the construct of interest.

Benefits to policy research. The BCSM is a useful mixed-method research approach for policy makers. First, as Speiglehalter et al. (2004) stated, posterior estimates are more inferential and therefore better aids to the decision-making process. Second, policy makers may hesitate to make decisions using qualitative data alone and the addition of quantitative data collected using a widely used instrument may increase the

extent to which research findings influence policy decisions. While a narrative comparison of qualitative and quantitative data should always be conducted in a BCSM, the elegance of a single posterior estimate is useful for policy makers that may not have time to read lengthy narratives.

Limitations. A limitation of the BCSM is that the researcher has additional research steps to consider. The researcher must design a methodologically sound mixed-method study but also consider how to elicit priors or estimate priors based qualitative data. The researcher must also have a sufficient understanding of Bayesian statistics and probability distributions to ensure the correct distributional families are selected. If a non-conjugate prior, from a different distributional family, is selected, then this further complicates computations.

Research Question 2

My second research question was the following*: How and to what extent does the clinic provide medical home care according to patient and staff interviews? What prior mean scores are assigned to each medical home domain for patient and staff groups based on interview data?* Interviews were conducted with 10 patients and 8 staff over the course of 2 months. Interviews were semi-structured and focused on processes for receiving and delivering services in the clinic. I describe results from patient and staff groups separately.

Clinic medical home characteristics: Patient interviews. Ten patients were interviewed over the course of one week. Interviews were one-on-one and lasted 40-55 minutes. Participants are referred to by patient participant number to maintain confidentiality.

First contact access and utilization. First contact describes the accessibility and utilization of clinic appointments and phone advice from or coordinated by a PCP for checkups, health problems, and specialist referrals (Pandhi et al., 2011). To begin the interview, the patient was asked to recount his or her first visit to the clinic because the first visit is an indication of the initial accessibility of clinic services.

First impressions. Patients were asked when they first came to the clinic and to describe their first experience at the clinic. Interviewees first came to the clinic between 1 to 15 years ago; six patients received care at the clinic for 1 to 3 years total, and the other four had been patients at the clinic between 8 to 15 years.

Nine of ten patients recounted a positive first experience and described the staff as nice, warm, or welcoming. Patient 2 favorably compared his first experience at the clinic to experiences at other clinics and stated, "I mean it wasn't like, like most places where you go to a hospital or clinic and people stare at you. Everybody was pretty much polite, seemed concerned, so forth and so on" (interview, June 1, 2015). Patient 1 expressed that after the first visit he no longer felt alone, saying, "I didn't have no idea that I had this kind of help. I thought I was out here by myself, but I seen I wasn't by myself" (interview, June 1, 2015). Patient 4 approached the first visit with trepidation but had a positive experience and said, "It was, the clinic was great. I was very nervous myself but the staff put me right to ease, got me into the system, got me going and make me feel really comfortable" (interview, June 2, 2015).

While nine patients had a positive first experience, Patient 9 first came to the clinic 15 years ago and described a cumbersome process, saying, "It was very compli-cated. It's gotten better now but back then it was very complicated. There were long

waiting periods" (interview, June 5, 2015). When asked to clarify, the patient said they couldn't remember exactly what was complicated other than the wait to be seen but reiterated that it was not an easy process to be a new patient at the Clinic 15 years ago.

Access to appointments and advice during office hours. Patients were asked to describe the process of making appointments for services received at the clinic. If needed patients were probed to explain how long they waited to get an appointment with a provider and how much time they spent in the waiting room on the day of the appointment. This question addressed the structural aspect of first contact access as it relates to the availability of services.

All patients explained that as they checked out after a visit they would make an appointment for the next visit. This was standard practice for all patients interviewed, and some patients explained that this ensured appointments were scheduled as needed because they would not remember to call. In summary, patient interviewees reported that regular check-up visits with a PCP took approximately 45-60 minutes, including wait time, the actual visit, and check out. Visits with psychiatrists took 45 minutes or less and visits with case managers took 30 minutes or less. Patients explained that they were able to get appointments at times that were convenient for them and that they could often schedule multiple appointments with different providers on the same day. Patient 8 reported that she was often able to schedule appointments for up to five different services in one day, which was helpful because it reduced trips to the clinic (interview, June 1, 2015).

All patients reported that when sick on a weekday, they were able to get an appointment on the same day or see a PCP on a walk-in basis; patients did not have to

wait long periods once in the waiting room. Patient 1 said he did not have to wait at all when he was sick (interview, June 1, 2015). Patient 2 recounted that he only waited an excessive period of time, about an hour, if he missed his appointment and was squeezed in after the scheduled time (interview, June 1, 2015).

The only type of service that patients complained about being inaccessible was for dental services. Two patients indicated they waited excessive periods of time to get a dental appointment. Patient 8 explained,

> I put in for dental last year in November and they contacted me last month. It was like six months, a six-month waiting period. I just did not hear from them that whole time, and when I did hear from them they were calling me to tell me that they had booked too many people on that date and that if I could come in on that same day that they could see me. (interview, June 4, 2015)

Access to appointments and advice after hours. Patients were asked what they did if they got sick during the evenings or weekends. If needed, patients were probed and asked if there was anyone they could call or see at the clinic during the evening or on weekends. This question also addressed the structural aspect of first contact access as it relates to the availability of services outside of regular clinic hours. Two interviewees had never tried to contact anyone after hours and were unsure if they would be able to do so. Four interviewees said that if they had an issue that needed immediate medical attention they called 911 or went to the emergency room after hours because they knew they could not contact anyone at the clinic during those times. Patient 8 knew of an after-hours crisis hotline number to call that a psychiatrist gave them. Patients 1 and 5 mentioned that they had their PCPs phone number where they could leave a message, and the provider would call them back right away. One patient said they were unsure if there was anyone they could contact after hours at the clinic.

Patient utilization of clinic services. Patients were asked to describe why and how often they saw a PCP. If patients had a case manager and/or mental health provider, they were also asked about visits to that provider. This question addressed the behavioral characteristic of patient utilization of services at the clinic. All interviewees said they would come to see their PCP before going anywhere else unless it was an emergency or they had another provider (e.g., a case manager, a psychiatrist) that could better assist them. Patient 1 was especially prone to look to providers at the clinic for advice on a range of issues and for making plans:

> I'm not going to go anywhere outside this clinic. If I need to go some-where else they tell me and I go somewhere else but meanwhile I'm going to come here. This is my first priority. Whatever these people want me to do this is the top of the list. This is the bottom line. I don't make any plans, vacation, nothing like that unless I check it out with them. Like I got a vacation I'm getting ready to take. I let them know when I'm going to take it. Then I make sure I'm in shape and able to take that vacation. They don't need me going nowhere ill. This is the place I come to actually help plan my life out now, bring me on out. See this is what I got going with my doctor. I don't do anything unless I check in with her. I let her call all the shots. I don't care how sick I am but I'm going to check with her before I do anything with myself. That's the way it's been for the last couple years (Patient 1, interview, June 1, 2015).

Ongoing care. Ongoing care is the provision of continuous care on a longitudinal basis and occurs when a patient consistently seeks care at the same clinic and with the same provider for preventative, acute, and chronic care services (NQCA, 2014, Stange et al., 2010). Ongoing care also refers to the patient-provider relationship over time and how well providers know patients.

Length of time receiving services. Patient interviewees were asked how long they had been a patient at the clinic. All interviewees sought services at the clinic for between 1-15 years and received nearly all non-emergency medical care at the clinic. Six patients received comprehensive services at the clinic for 1-3 years, 2 patients received services

for 8-9 years, and another 2 patients received services at the clinic for 15 years. Patients

detailed that services, such as mammograms and MRIs, that were not available at the

RWP center were coordinated by the clinic to take place in an affiliated hospital.

Frequency of services. Patient interviewees received services at the clinic as often

as two times per month or as little as once every 4 months. Patient 1 mentioned that

frequent visits were key to his improved health: "I come at least two times a month. I

want to touch down with these people here cause they are really doing a great job with

me and whatever we doing we want to maintain cause it's working" (interview, June 1,

2015). Table 4 lists the length of time each interviewee received services at the clinic and

how often.

Table 4

Service Continuity: Interviewee Length of Time as a Clinic
Patient and Frequency of Visits

Participant No.	No. of Years	Visit Frequency
1	2	Every 2 weeks
2	1	Every 2 weeks
3	2	Every 2 weeks
4	1	Every 8 weeks
5	9	Every 2 weeks
6	15	Every 16 weeks
7	8	Every 12 weeks
8	1	Every 16 weeks
9	15	Every 2 weeks
10	3	Every 2 weeks

Provider continuity. Patients were asked if they saw the same provider each time they came to the clinic for a particular service. Every patient interviewed saw the same PCP or consistent member from a team of providers, which may have been a physician assistant or nurse that consistently worked with a specific physician, at every medical appointment. For example, if a patient was acutely sick, they may have seen a nurse, whom the patient knew and who worked with his or her physician, if the patient's physician was not in clinic that specific day. Regular appointments were with the patient's physician. Patients with medical case managers and mental health professionals such as counselors and psychiatrists also saw the same providers at each visit for that service. Patients saw the same provider as long as that provider was employed at the clinic, which was often for several years. For example, Patient 7 had the same mental health counselor for seven years. Patient 9 had three medical case managers over the course of 15 years. Patients did not have consistent pharmacists or dentists but all had a team of consistent medical and mental health providers.

Patient-provider relationships. Patients were asked if and how well their provider knew them as a person. More specifically, patients were asked if their PCP was familiar with their home life and if or where they work. In nine of ten interviews, the patient indicated that his or her PCP knew him or her as a person. All patients described having an open dialogue with his or her PCP about personal circumstances at home, such as if they had a new partner or were on the verge of homelessness. For example, Patient 8 stated, "I have a good relationship with my doctor and I put all my trust in my doctor" (interview, June 4, 2015). All interviewees discussed that they were comfortable asking PCPs questions about their personal health and that the provider's answers were helpful.

Patient 8 developed a strong bond with a previous physician at the clinic and was upset by her provider's departure from the clinic. She explained,

> My first provider, she was with me for 11 years until she left and I hated it. Yeah, you get to know someone and you're comfortable with them and they know all about your background. Yeah she was like a girlfriend. (interview, June 4, 2015)

Patient 8 also explained that she did not have the same rapport with the current physician; however, she had seen the new physician twice and they "seemed pretty nice" (Interview, June 4, 2015).

Patient 5 described a nurse as being like a mother figure to the patients, saying, "She is like a mama. Sees all them guys over there. She takes care of them. We get sandwiches and she makes sure we do the right thing" (interview, June 3, 2015).

Coordinated care and information systems. Coordinated care is the provision of referrals for specialty services; assistance making specialist appointments; communication between the primary care provider, specialist, and patient; and patient access to medical records. Patients were initially asked broad questions about processes at the clinic to learn all the ways in which services may have been coordinated.

New patient education and financial counseling coordination. Interviewees were asked to describe where they went and what happened when they initially became a patient at the clinic. All but one patient interviewed indicated that they went to new patient education upon becoming a patient at the clinic. Patients discussed one-on-one sessions where they received basic HIV education and information on services available at the clinic and how they may qualify for those services. For example, Patient 8 described, "She [the education counselor] explained a lot of things to me and a lot of

services that are provided to me as well. So I got a better understanding of how it works and how the services run" (interview, June 4, 2015).

The same nine patients described a visit to financial counseling, after the education session, where a financial coordinator determined if they qualified for services under the RWP, the AIDS Drug Assistance Program, Medicare, or Medicaid. Patient 9 did not remember his initial visit at the clinic because it was 15 years ago.

Coordination of services and referrals to specialists by PCPs. Patients were asked which services they received at the clinic and how they obtained appointments for those services. Six patients responded that their PCP initially made appointments for them to see a psychiatrist, dentist, nutritionist, or case manager. When patients were asked if they received any healthcare services outside of the clinic, four patients mentioned that they went to an affiliated hospital for procedures, such as mammograms, ultrasounds, mole removal, and eye exams. These patients were asked how they made appointments for services at the hospital; all four replied that his or her PCP arranged the appointments. Patients were asked if and how their PCP knew what happened after the appointment with the specialist. All patients explained that the PCP knew what happened at the appointment because they told them during subsequent visits.

Coordination of services and referrals to specialists by allied health professionals. When asked about services they received at the clinic, five patients responded that they had a medical case manager. Patients reported that they met with a case manager at least monthly and the case manager coordinated appointments with other clinic staff such as housing coordinators and nutritionists. Case managers also provided

patients with documentation so they could obtain half price cards for public transportation. One patient discussed how his nutritionist made him a dental appointment and also arranged for food pantry services because he had been unable to eat regular food because of problems with his teeth. Patients shared that the case manager or nutritionist knew what happened after the appointment with the specialist because they updated the provider during the next visit.

Information systems and medical record coordination. Patients were asked if they were able to look at their medical record from home or at the clinic. All interviewees said they could look at their medical record during a visit to the clinic. Only Patient 8 accessed her medical record and sent messages to her PCP using the online medical record patient portal. Patient 8 said, "If there's something going on with me that I'm just not sure about like if I see something and it scared me I get onto it [the patient portal] and send him a message and request an appointment that way" (interview, June 4, 2015). All other patients were either unaware of the online patient portal or were unable to access it from home because they did not have an internet connection.

Comprehensive care. Comprehensive care entails the provision of primary and preventative care, specialty care, and support services for acute and chronic conditions (Stange et al., 2010). Patients were asked what they did when they were sick, where they went for regular checkups, and where they went for chronic health issues. All 10 patients interviewed reported that they went to the clinic for regular checkups and for primary and HIV care, including laboratory testing. Eight patients picked up prescriptions at the clinic; one patient previously used the clinic's pharmacy, but her current insurance was no longer accepted at the clinic. Nine patients received dental care, five patients had

medical case managers, five patients had psychiatrists or mental health counselors, five

patients received housing assistance, three patients received public transportation

assistance, and two patients visited dermatologists at the clinic. Patient 3 described all the

services he received in addition to primary and HIV care:

> For me, I got dental, eyeglasses, not that I got them, but my eyes, I get my eyes checked regular, go see the dentist regular. Also go there to see a psychiatrist, you know, for anxiety. And occasionally, what I really like doing when I got a lot of time on my hands I might like interact with one of their little classes they have going on, whatever they have them, you know, one of those meetings they have about substance abuse. (interview, June 2, 2015)

Patient 7 also described the comprehensive services at the clinic:

> It has everything. It has a dermatology clinic, it has the food pantry, they has group meetings, they have you know, you can see the doctor, you can call back if you have any questions about anything, and they're always very precise and helpful. (interview, June 4, 2015)

Eight patients also mentioned medication adherence support from physicians,

nurses, or case managers. Patient 3 described that almost every provider he came in

contact with addressed medication adherence or taking medications as prescribed. Patient

3 explained, "Well basically, pretty much basically, every person that I come in contact

with, you know they, they kind of like ask you in a kind of way whether or not, you

know, if you take your medicine" (interview, June 2, 2015).

Patient 9 noted the benefit of the clinic providing so many services saying,

"Because even like now, being long-term, people new to diagnosis it's more convenient

because everything is right here. They can do everything here" (interview, June 5, 2015).

Services patients mentioned during interviews are listed in Table 5.

Patient prior estimates based on interview data. For my study the PCAT

provided a scale of 1 to 4 for basing prior estimates on how likely the clinic was to have

provided or coordinated certain services. I used this range with the associated Likert

ratings (1 = definitely not, 2 = probably not, 3 = probably, 4 = definitely) to estimate

Table 5

Services Received by Number of Patient Interviewees (n=10)

Type of Service Received	No. of Patients Receiving Service	Type of Service Received	No. of Patients Receiving Service
Primary Care	10	Mental Health Counseling	3
HIV Care	10	Substance Abuse Counseling	3
Dental Care	9	Transportation Assistance	3
Pharmacy	8	Dermatology	2
Medication Adherence	8	Ophthalmology	1
Housing Assistance	5	Child Care	1
Case Management	4	Nutrition	1
Psychiatry	3		

priors for each interviewee and for each PCAT item. With a possible score range from 1

to 4, higher mean domain scores indicated that the medical home characteristic is more

likely to be in place at the clinic. For example, a mean PCAT domain score of 3.5

indicated the associated medical home characteristic is probably or definitely in place at

the clinic.

Because I sought to estimate priors based on the PCAT domains and scale, I

primarily used concept-driven content analysis (Kvale & Brinkmann, 2009), which

entailed analyzing the data according to the medical home domains: first contact

utilization and access, ongoing care, coordinated services and information systems, and

comprehensiveness of services available and provided. I first analyzed each interview

transcript for mentions of the provided or coordinated service according to the services addressed in each PCAT item. I tracked references to services and also analyzed transcripts for mentions of the degree to which the service was likely to be provided. Next, I used data-driven coding (Kvale & Brinkmann, 2009) to look for indicators of services and processes that might align with medical home principles but were not specifically addressed in the PCAT. I assigned a score to each interview for each medical home domain item in the PCAT. Then I used the method described in the PCAT manual for summated Likert scales to calculate prior mean scores for each participant. Overall mean scores were then calculated for each domain. Table 6 shows prior mean scores for each domain.

Patient perceptions of the clinic. In addition to information around healthcare services and processes, patients were also asked about their perceptions of the clinic.

Table 6

Patient Prior Mean Scores and Standard Deviations

Domain	Prior M	Prior SD
First Contact – Access	2.80	0.31
First Contact – Utilization	3.90	0.21
Ongoing Care	3.65	0.34
Coordination – Services	3.38	0.40
Coordination – Info Systems	2.70	0.11
Comprehensiveness – Services Available	3.65	0.13
Comprehensiveness – Services Provided	3.42	0.15

Note. $n = 10$.

Data collected around patient perceptions of the clinic did not fit into a medical home domain and therefore are described separately here.

Patients were asked how they would describe the clinic to a friend with HIV and if they would recommend the clinic. All 10 interviewees indicated they would recommend the clinic to a friend with HIV. Patient 7 confirmed that she would recommend the clinic and said, "I sure would [recommend the clinic], yes. It's the best place" (interview, June 4, 2015). Patient 2 said he would describe the lower cost and variety of services, compared to other clinics, to a friend with HIV by saying, "It's basically cheaper than the services they are receiving from their private doctors and there has been a lot of services here versus where they have gone" (interview, June 1, 2015). Patient 3 said he would recommend that a friend "Go [to the clinic]. People care. It's worth it to me, that's my opinion. I can't speak for nobody else but the experience I have, I think it's worth it" (interview, June 2, 2015). Patient 4 said, "The staff cares, first of all and they are top notch making sure that you get the care that you need. Any questions that you have, they are available [to] you and you get better" (interview, June 2, 2015).

Three interviewees mentioned that a friend did recommend the clinic to them prior to their becoming patients themselves. Patient 8 said,

> I actually have a good friend of mine and he referred me to come here
> always. He told me that they would treat you nicely and make sure that
> you get on your meds and things like that, and since I've been coming
> here I haven't had no complaints (interview, June 4, 2015).

Patients' positive impressions of the clinic were consistently conveyed during interviews. When asked what a visit to the clinic was like, Patient 5 responded, "I enjoy myself. Well, I'm real friendly and I like the people that I be around" (interview, June 3, 2015). Patient 5 said that the length of time he is at the clinic during a typical visit varies

because he enjoys being there and may stay longer than necessary. At the end of the interview, Patient 7 closed by saying, "Oh, I just think this is a great clinic, and I hope they continue the progress that they have achieved, and I love it here" (interview, June 4, 2015). Participant 8 indicated that the Clinic saved her life and explained,

> I call it my safe haven, because when we sit down and have conversations about (the clinic) I can't say nothing bad because at the end of the day I feel like this place doesn't faze me so I'm never gonna say nothing bad. Because at the end of the day, if it wasn't for this place, there ain't no telling where I'd be or what type of predicament I might be in. So I always have nice things to say and a lot of my friends come here. (interview, June 4, 2015)

Clinic medical home characteristics: Staff interviews. Eight staff were interviewed over the course of seven weeks. Interviews were one-on-one and lasted 45-70 minutes. Six clinicians, including five PCPs, were interviewed. The other two staff interviewed were not clinicians. Staff that were interviewed had worked at the clinic for 3-25 years. Participants are referred to by staff participant number to maintain confidentiality. For the purpose of this summary, PCPs were prescribing providers licensed to prescribe medications. Prescribing providers include advanced practice nurses, physician assistants, and physicians. Clinical staff, or clinicians, include PCPs, licensed practical nurses, psychiatrists, and pharmacists.

First contact access. First contact describes the accessibility of clinic appointments and phone advice from a PCP (Pandhi et al., 2011). I began the interview by asking the interview staff to describe how PLWH became patients at the clinic, obtain medical advice, and make appointments for regular checkups and for acute issues during and after regular clinic hours.

Access to the clinic. Throughout interviews, all but one staff shared that many patients had little to no healthcare prior to becoming patients at the clinic because the

patient population was largely uninsured. All staff that were interviewed described the same criteria for becoming a patient at the clinic. To receive care at the clinic, a patient must have a confirmatory HIV diagnosis and a CD4 cell count below 200 or an HIV-related opportunistic infection. Parents of HIV infected children treated at the clinic were an exception to the criteria and were also able to receive care there. The women's and pediatric subclinic is where children and their parents received medical care. The adult subclinic is where men received care. Clinical staff explained that once patients were linked to care at the clinic, they had a first appointment with a prescribing provider within 28 days. The clinic was open Monday to Friday from 8 am to 5 pm for most but not all services.

Access to appointments and advice during office hours. All staff concurred that patients waited about one month for the first clinical appointment after being referred to clinic, typically by a health department or hospital. Because patients were typically uninsured, they were diagnosed at a health department or were hospitalized because of an opportunistic infection and diagnosed at the hospital. Follow-up appointments were scheduled regularly depending on how stable patients were and how often they needed lab tests. Staff indicated that patients made follow-up appointments for services at the end of an appointment.

All staff described a similar process when patients had an immediate medical need during clinic hours and explained that patients were always seen the same day when the clinic was open. When patients called the clinic, a team nurse provided advice about whether they should come to the clinic or go to the emergency room for more serious issues. Patients were also able walk into the clinic and a team nurse would triage them. In

some cases the nurse would treat minor issues. If the patient needed to be seen by a prescribing provider, then his or her PCP would see them if the provider was in the clinic that day. If the patient's PCP was not in the clinic that day, then the physician of the day would see the patient. Staff 6 described this process:

> We encourage them to call their team nurse first, but they don't have to. And the only reason is that if they call their team nurse, they can kind of get triaged over the phone, and told, "Oh, you're having chest pain. Please call 9-1-1" versus coming to us. Or, "Oh, it sounds like you need some cough syrup," or whatever it is. Sometimes that helps and also, sometimes it's just clear from the phone conversation that they need to come in and be seen. The nurse can kind of give them a time [to come to the clinic], or a rough time, because then it might help them from having to sit all day long, waiting. But a lot of times people just show up and that's fine and when they're sick, if the provider, if their provider is not available to see them, then they'll be seen by the attending physician and that happens all the time, every single day. (interview, July 10, 2015)

In regards to other clinic services, staff explained that the initial appointment with a psychiatrist could sometimes take up to three months unless there was an emergency need for psychiatric care. There was also a long wait for dental services, which could take up to four months for an appointment. Other services were offered on a non-appointment basis. For example, the department that provided housing services operated on a walk-in basis Monday to Friday. However, since housing services were provided on a first-come first-served, basis some patients had to wait so long they could not be seen the same day; patients would have their case assessed that day if they could wait. There was also a transition center that provided support services, such as pill trays and group counseling, on a walk-in basis. When probed about why these services were provided on a walk-in basis, staff explained that patients that required support services are often unable to make or keep appointments and need the flexibility to receive services when they could make it to the clinic.

Access to appointments and advice after hours. All staff confirmed that there were no evening or weekend hours at the clinic. Nor was there was there an after-hours advice line for patients. One multilingual clinician explained that she gave many of her French and Vietnamese patients her cell phone number because many of them have challenges and need a clinic contact that speaks the same language. Staff 8 explained,

> I get to know all of my French and Vietnamese speaking people because you know, from experience I know they are struggling. Because when they need something they call. The nurse doesn't understand what on earth they are talking about on the voicemail and so they all have my cellphone. I'm told that that's not a good idea but how else are they going to be helped? (interview, July 16, 2015)

Ongoing care. Ongoing care is the provision of continuous care on a longitudinal basis. It occurs when a patient consistently seeks care at the same clinic and with the same provider for preventative, acute, and chronic care services (NQCA, 2014, Stange et al., 2010).

Length of time that patients receive services. All staff explained that patients received care at the clinic for variable periods of time with some patients receiving care at the clinic for many years. Some patients ultimately fell out of care and never returned to the clinic. PCPs had some patients for as little as several months and others up to 15 years. Staff 7 remarked, "Well I've got people that, that have been with me since the 90s" (interview, July 13, 2015). While some patients consistently sought services at the clinic, others would go elsewhere; however, many patients returned. For example, four staff reported that some patients relocated to other states and when they moved back they also returned to the clinic. Other patients sought care at private practices when they newly qualified for Medicare or obtained private insurance as a result of healthcare reform.

Many of these patients returned to the clinic because of the lower quality of care elsewhere. Staff 8 explained,

> I have patients who I have seen since I came here which is year 2000. I have people who had to be relocated because of a job and who came back and want to, you know, still be with me. There are other types of people I have. They get lured by private parties who find out that they now have Medicare, and they come to them and say you know, come to our practice or whatever. So they go there and they see, and they quickly realize that the services they get in those private practices are not as good as what they get here (interview, July 16, 2015).

PCPs described caring for patients for long periods of time throughout major life events and decisions. Staff 7 remarked,

> Yeah, so I have one patient who signed up thirteen years ago. I've seen her through her pregnancy. So possibly, you know getting back with this person that she was with. So yeah I've got patients that I've seen, you know, fifteen years, thirteen years, ten years. I've got a lot of people that have been with me for a long time (interview, July 13, 2015).

Three staff interviewed provided services to patients for a short period of time because they delivered standalone services such as housing coordination, HIV education, or medication assessment and adherence counseling. Other providers cared for patients for a set period of time until the patient was reevaluated. This was the case for services provided by clinical pharmacists that worked with patients with medication adherence issues. One staff member explained that patients met with clinical pharmacists at increasing intervals until they had an ARV regimen that was tolerable and that they took consistently. In this case patients typically worked with a clinical pharmacist for two to three months.

Frequency of services. Staff explained that standalone services, such as housing coordination or food pantry, were provided to specific patients one to three times. PCPs reported seeing patients as frequently as every 2 weeks to every 5 months at the most.

The sickest patients, those with the highest viral loads and/or opportunistic infections,

were seen every 2 weeks for monitoring. These were often new patients who had never

been on ARVs or had not taken them in some time. Stable patients in good health, with

controlled or undetectable viral loads, were seen less often. However, even stable patients

had scheduled appointments no more than 6 months apart because of reenrollment

requirements. Patients with appointments more than 6 months apart have to reenroll in

care at the clinic. Staff 7 described why patients were seen at varying intervals:

> So the stable patients, I'm seeing them about every four months to maybe
> five months. You know if they are beyond six months then they have to
> reenroll [in the clinic]. So we try to keep it under six months. I have a
> couple patients that are very self-sufficient. You know, they don't want to
> come in unless absolutely necessary so we do about five months but for
> most patients it is every four months if they're stable. If they're sick it
> could be even every two weeks. Like some new patients that are very sick
> I see [them] every two weeks to every month. Until I feel that they are
> stable and responding to the medication and other, you know, new
> opportunistic infections and they start their regimen and adhere to how to
> take their medicines. Then progressively [they] can go longer and longer.
> (interview, July 13, 2015)

Provider continuity. All PCPs confirmed that they had a caseload of patients and

consistently saw those same patients. The only exception was when patients were un-

scheduled and came to the clinic for an acute issue and his or her provider was not in

clinic that day. Otherwise staff emphasized that patients had consistent providers. Staff 4

summarized the process:

> At other clinics you may see a different provider every time you go in.
> That's not how we do it here. Patients are assigned a provider. Additional-
> ly, they have a team nurse that they get to know well. The team nurse is
> assigned to specific providers so they know all the patients on their panel.
> (interview, June 24, 2015)

Patient-provider relationships. Six staff explained that they asked patients open-

ended questions to establish a rapport, understand patient circumstances, assess readiness

for ARV regimens, and to convey that the patient is an important part of the care process and not just a recipient of care. The first visit was portrayed as a crucial moment for setting the tone for patient-provider relationships.

PCPs all described a similar process for getting to know patients during the first visit. On a new patient's first visit, a medical exam is performed and a full history is taken. This includes medical, surgical, sexual, and substance use history but also information about the patient's life, such as involved family members, children, social activities, work, and housing and roommates. Providers focused on the learning about all facets of patients' lives. Staff 3 explained,

> I'll ask about specific issues that they may not realize were related to HIV.
> Aside from the HIV, I ask about just general medical history, family
> history, surgical history, social history, which includes their substance
> abuse history, their occupation, their current living situation, their family
> situation, whether they are currently in a relationship or not, and if they
> are, are they sexually active, or what sort of sexual practices they have.
> (interview, June 15, 2015)

This first visit was also when PCPs inquired as to how patients may have acquired HIV, what patients know about HIV, and if applicable why patients did not seek care after the initial HIV diagnosis. Staff 3 listed these questions:

> How do you think you acquired it? When do you think you acquired it?
> Depending on the answer to that question, what has kept you out of care
> until now? What do you know about it? Do you have friends who have the
> disease? (interview, July 15, 2015).

Two PCPs described how a patient's perception of HIV was key to his or her ability to deal with the disease psychologically. One PCP described how during the first visit she explained to patients that HIV was not the fatal disease it once was and made an effort to destigmatize the disease. Staff 6 explained,

> I always share with them that this is not a death sentence, and that we're
> glad you're here, and if you stay in care and take your medications you can

expect to have a normal lifespan. And I talk about how HIV and how we're seeing it more as a chronic illness, just like diabetes or heart disease. I try to sort of destigmatize it, especially if they're really young and scared. And then I ask them how they're coping with their diagnosis, and have they shared this information with anybody. (interview, July 10, 2015)

The first visit with staff that specifically focused on medication management looked slightly different from a first visit with a PCP. Staff 1 explained that there was a focus on asking open-ended questions, engaging the patient in the care process, and establishing rapport. The emphasis was on patient education around ARVs, side effect management, and conversations that encourage patients to open up about any issues they may be having with medication. Staff 1 remarked,

> And then I always, if someone is getting started on ARVs then I'm always going over again what the adverse effects are. I usually try to do that with a very open ended question like, what problems are you having with the medication? And then a lot of people will just say none. So then I try to be much more specific and make sure to ask them specifically about the things that I would be most concerned about based on what meds they're starting on. I try to engage to the patient as much as I can and try to make them feel, you know, they are a part of the process of their care. And try to make them feel like they are and try to provide them with as much information as they'd like. That's another thing. It can be a little bit difficult trying to gauge how much information to provide without overloading the patient. But also making sure they understand as best as they can why things are important (interview, June 5, 2015).

Coordinated care and information systems. Coordinated care is the provision of referrals for specialty services; assistance making specialist appointments; communication between the primary care provider, specialist, and patient; and patient access to medical records. Staff were asked follow-up questions around service provision to learn how staff communicated about patients and learned what happened during and after referral services.

Care coordination during intake. Staff described how care coordination begins at the clinic on day one. Patients are guided through a structured intake process, which

begins with a financial assessment of patients' eligibility for the RWP, Medicare, Medicaid, private insurance, and ADAP. All patients must have a documented HIV diagnosis and were screened for tuberculosis during intake. HIV education during intake entailed an overview of what HIV is, how it is transmitted, and how the disease is managed. The education session also involved an overview of all the services offered at the clinic so that patients were aware of the services available to them. Next, patients received a mental health screening and were automatically referred for services if they had a history on mental illness. All of these processes occurred before the patient met with a PCP. The initial visit with a PCP was patient's next scheduled visit after intake. The only exception to this was if a patient was hypertensive, short of breath, or otherwise in need of immediate medical attention.

Care coordination by PCPs. PCPs were generally the first providers to coordinate care for patients. PCPs referred patients for specialty medical services and if needed for psychiatry, case management, or support services. During interviews PCPs explained that for nearly all their patients they managed their primary and HIV care and therefore were aware of all the care provided to patients.

However, because of their private insurance networks, some patients received primary care elsewhere and HIV care from the PCP at the clinic. Two PCPs described that when patients received primary care outside of the clinic, the best they could do was to write a note to the primary care provider with crucial health information and his or her contact information at the clinic.

Care coordination by case managers and allied health professionals. Case managers helped with a wide range of care coordination. For example, the housing

coordinator mentioned that case managers would sometimes complete patients' housing applications before the patients came for housing assistance. Case managers and housing coordinators would also follow up with patients around obtaining the necessary documents to complete housing applications.

Facilitation of care coordination through communication. Six staff emphasized the importance of communication in care coordination. Staff communicated about patients using electronic medical record notes, via phone, and in passing. Team nurses had morning huddles to discuss patients on the roster for the day. A provider that worked with patients with complex regimens, medication adherence issues, and difficult to manage side effects discussed communicating with the patient's PCPs. Staff 1 described the process:

> So I guess we, I could say that I always communicate with the provider, but it may be indirectly. So there's always a note written for the visit that I had with the patient and that's accessible to any of our providers. So, they can go back and see what was discussed during the visit with the patient. Typically depending on how large my concern is, I will either send a message through our electronic medical record. If there's something that I kind of want them to look out for and they have an upcoming appointment with that patient or if I'm trying to help facilitate something like them getting labs for somebody that may need it to avoid missing anything that we need to keep monitoring for the patient. If it's something significant enough, then I will go find the provider and sit with them. If there's a significant issue going on with the patient during the visit, then there's always an attending physician in the clinic at all times and I would discuss it with the attending physician before the patient left the clinic. (interview, June 5, 2015)

Care coordination and information systems. The clinic's electronic medical record system was essential to staff communicating to coordinate patient care. PCPs confirmed that the medical record system tracked services provided and contained demographic information, housing status, financial and insurance information, family and patient medical history, lab test results, mental health notes, problem lists, and medication

lists. Medication lists were checked every time a prescription or over-the-counter medication was prescribed. For patients who used the onsite pharmacy, the medical record also contained the status of patient prescription pick up. One PCP explained how every staff member that provided a service wrote a note in the medical record and that note could be viewed by other staff. PCPs reported that this was the primary way that he or she was updated on patient issues.

Staff were probed about patient utilization of the online patient portal for accessing medical records and communicating with providers. Staff unanimously remarked that the portal was virtually useless for the patient population at the clinic. Staff explained that most patents lacked internet access at home and therefore could not use the portal. Furthermore, patients had more pressing issues than accessing medical records, tracking lab results, and messaging providers. Staff 8 remarked,

> For the majority of patients that I see, they don't even know what they
> have to eat tomorrow or whether they have a place to live. I don't think the
> patient portal makes any difference to their health. If your needs are not
> addressed, how on earth can you afford a laptop, desktop, to be able to
> access this? Some of them cannot even read. Like I have a few patients
> who for like the last ten years that I've known them identify their pills by
> color. So when the drug company went generic and then they changed the
> color of the pill, the patients got so anxious and upset because they
> thought their meds were changed. You know, so those are the kinds of
> things patients deal with. How on earth does the portal help those people?
> (interview, July 16, 2015).

Comprehensive care. Comprehensive care is the provision of primary and preventative care, specialty care, and support services for acute and chronic conditions (Stange et al., 2010). All staff described a variety of services offered at the clinic. In addition to onsite services, patients received referrals for services offered at the parent hospital. At the core of comprehensive service provision was the convenience associated

with PCPs at the clinic providing specialty HIV care and primary care for a large majority of patients.

Instead of treating HIV as a specialist service, HIV care was provided hand-in-hand with primary care, which facilitated management of common comorbid conditions, such as heart disease, hypertension, and diabetes. Every PCP interviewed reiterated the integration of HIV and primary care that Staff 6 conveyed: "I do all their primary care and their [patients] HIV care" (interview, June 6, 2015). In fact, one PCP was trained as an internist, not in infectious disease, and later specialized in HIV.

Staff were not directly asked about comprehensive care but rather were asked to describe the services provided at and coordinated by the clinic. Nonetheless, the term "comprehensive" was emerged throughout the interviews. For example, Staff 3 explained,

> I'd say that it's a pretty comprehensive and well-established one-stop shop for their HIV care with a lot of experience and a lot of patients, where all we do is take care of HIV patients, so we're well-attuned to the needs they may have, be it medical or social (interview, June 6, 2015).

A wide variety of services were mentioned by staff during interviews. Services are categorized as core medical, specialty medical, and support services. Core medical services were provided to all patients if appropriate. For example, gynecology is a core medical service offered to girls and women. Specialty medical services encompass all other medical services provided at the clinic. Specialty medical services were provided to patients with a specific need and were performed by specialized staff. Support services are additional services available at the clinic that meet a psychosocial, language, and financial needs.

Core medical services. Primary care, HIV care, gynecology, dental care, pharmacy, and medication adherence services were mentioned by all staff interviewed and were offered onsite at the clinic daily. However, services that were offered daily were not necessarily available to all patients on a daily basis. For example, dental services required a 2-6 month wait for an appointment. Medication adherence services primarily addressed ARV regimens and were addressed by PCPs, by adherence nurses, and clinical pharmacists. Patients struggling with medication regimens were referred to adherence nurses and clinical pharmacists by PCPs as needed.

Specialty medical services. Table 7 lists the specialty medical services mentioned by staff, where, and how often the services were offered. Not all services were mentioned by every staff member interviewed. Services listed were mentioned during at least two interviews. PCPs referred patients for these specialty services. Some services were embedded in the clinic and offered daily and others were provided onsite weekly.

Table 7

Specialty Medical Services Mentioned by Staff Interviewees

Service Type	Service Location	Frequency
Cardiology	Affiliated hospital	Daily
Dermatology	Onsite	Weekly
Gynecology oncology	Affiliated hospital	Weekly
Hematology/oncology	Onsite	Weekly
Hepatitis C/Liver disease	Onsite	Daily
Hepatology	Onsite	Weekly
Mammograms	Affiliated hospital	Daily
Neurology	Onsite	Weekly
Nutrition	Onsite	Daily
Ophthalmology	Onsite	Weekly
Palliative care	Onsite	Weekly

Service Type	Service Location	Frequency
Psychiatry	Onsite	Daily
Radiology	Onsite	Weekly

Note. n = 8.

Hepatitis C and liver disease treatment was offered onsite in a specialty subclinic.

Psychiatry and nutrition counseling were also embedded in the clinic. The clinic was able

to offer many other specialty medical services onsite through its affiliation with the larger

parent hospital. Dermatology, hematology/oncology, hepatology, neurology, ophthalmo-

logy, radiology, and palliative care specialists from the affiliated hospital came to clinic

weekly to provide services. Patients were also referred to the affiliate hospital for

mammograms, cardiology, and gynecological oncology services.

Support services. Table 8 lists a wide variety of support services mentioned by

staff, where, and how often the services were offered. Financial navigation, ADAP

financial counseling, and insurance navigation services were available to assist patients

with payment options, enrolling in drug assistance programs for ARVs, and to help

Table 8

Support Services Mentioned by Staff Interviewees

Service Type	Service Location
ADAP financial counseling	Onsite
Case management	Onsite
Financial navigation	Onsite
Food pantry	Onsite
HIV education	Onsite
Housing assistance	Onsite
Insurance navigation	Onsite
Mental health counseling	Onsite
Substance abuse counseling	Onsite

Transition center (support groups, peer counseling, pill trays, art and exercise classes, education)	Onsite
Translation (Spanish)	Onsite
Translation (All languages)	Phone
Transportation assistance	Onsite

Note. All services offered daily. *n* = 8.

patients find insurance plans that had the patient's providers in-network and covered

drugs on affordable tiers. Case managers were assigned to the most complex patients to

address urgent needs, coordinate support services, and to consult with external agencies

to provide resources and services. HIV education around how the disease is transmitted,

and managed, symptoms and comorbidities, and the importance of ARVs and adherence

was provided at intake. A Spanish translator was onsite at the clinic daily and the clinic

used an AT&T translation service line was available for all other languages daily.

Other services were offered onsite on a daily basis to assist patients with issues

that can take precedence over health. These are issues that may prevent patients from

addressing health such as insufficient food, lack of transportation to medical

appointments, substance abuse, mental health issues, and homelessness.

The clinic has an entire organization onsite devoted to housing that worked to

prevent homelessness and assist patients with applications for emergency, temporary, and

long-term housing solutions. Staff 2 described the variety of housing related services

offered by this department:

> We are the [state's] largest facilitator of housing services for people with
> HIV/AIDS. We do that by providing housing options, housing counseling,
> housing procurement. We do homeless prevention in the way of emer-
> gency financial assistance, we provide short term rent, mortgage, and
> utility assistance and those are for clients who are in their own apartments
> but who have come upon a hardship and are unable to pay their rent,
> utility, or mortgage bills. So we provide one-time assistance just to help

them get caught up so they can maintain their current housing situation. We assist clients in completing supportive housing applications and then pass them along to those housing providers. We also have a special needs housing assistance program, transitional housing program for clients who have substance abuse issues, fragile health, or transgender. And we partner with housing providers in the community that we place those clients with the housing providers and pay a subsidy for them to stay there and get treatment and stabilize and work on permanent housing options for them. And another program we offer is our emergency lodging, and it's for our clients who are literally homeless. They can walk into our office, any time Monday through Friday, and be assessed for emergency placement and that might include a sixty day hotel stay that we provide. So I think that the way our services fit in well, what's great about this clinic is that it is intended to be a one stop shop (interview, June 10, 2015).

Staff prior estimates based on interview data. I used the same method employed to estimate patient prior mean scores to calculate staff prior mean scores. There is not a First Contact Utilization domain for the staff PCAT; therefore, a prior was not estimated based on staff interviews for this domain. Table 9 shows staff prior mean scores for each domain.

Challenges. Staff shared challenges to providing care and coordinating services during the interview and at the end of the interview when they were asked if they had anything additional to share. Challenges fell into three categories: the Affordable Care Act, stigma, and poor social determinants of health.

Table 9

Staff Prior Mean Scores and Standard Deviations

Domain	Prior *M*	Prior *SD*
First Contact-Access	2.84	0.27
Ongoing Care	3.34	0.63
Coordination-Services	3.31	0.29
Coordination-Info Systems	3.40	0.47
Comprehensiveness-Services Available	3.38	0.23
Comprehensiveness-Services Provided	3.25	0.46

Note. n = 8.

Healthcare reform. Four staff mentioned that the Affordable Care Act had presented challenges to care provision for patients. Specifically, some patients that previously qualified for the RWP no longer qualified because they were eligible for private insurance subsidies. While staff mentioned this was limited to a small number of patients, the challenges for those patients were significant. Patients who once received a wide variety of medical and support services at no charge were suddenly faced with high deductibles and drug costs they could not afford. Staff 6 explained the clinic's approach to addressing this issue:

> We kind of had a sort of crisis meeting some time ago, I think it was last year some time, where we realized what was happening, and we realized that patients signed up for plans without reading the fine print of the pharmacy benefits, and they were showing up to pick up their pre-scriptions and being told, you know, they had a $3000 co-pay. That kind of thing. So, what we've done, luckily, we have people in the building that help find people for ADAP, they're called patient systems analysts, and so they now have, they know all about prescription drug cards, and they know how to get help from the drug company that makes the drug that we need, and then there's the PAN Foundation, which is the Patient Access Network, or something like that. So, they can help with drugs, and so we have all these different ways to get the medication for patients. And I think even ADAP pays for, helps pay for co-pays, too. So, we've been able to

get around it mostly, now, but when it first started, there were a lot of patients that had interruptions, before we knew how to handle it. (interview, July 10, 2015)

Stigma. Three staff explicitly mentioned stigma as a barrier to providing care. Providers explained how some patients had not disclosed their HIV status to any friends, family, or coworkers for fear of what may happen if others learned they were HIV positive. Providers explained that the clinic building was known to be an HIV clinic by locals in the area. Patients with undisclosed status feared that they would be seen entering the clinic. Staff 8 described this situation for patients that had jobs in the area:

> They would say doctor we love you. But you know it's tough. You know like a manager at a bank cannot afford to be seen at [an HIV clinic]. You know, God forbid like somebody in my job sees me here, you know, and other patients are like nurses and stuff like that. And then they say, you know, when they come here they tell you must like almost wear a mask. Then they wear a hood and a mask, and then they hide in the corner, and live in the fear of being seen. And they keep on like when they come, they don't want to like sit in the waiting room. They will call me and say, hey doc, can you let me into an office so that I don't have to sit here. So there is a lot of stigma here and I don't blame them, you know. Like you work in the health field, the last thing you want is to see a patient of yours see you there (interview, June 16, 2015).

Social determinants of health. SDH are conditions that affect health such as access to housing, education, healthcare, nutritious food, and transportation (CDC, 2015). The issue of poor social determinants of health was mentioned by every staff participant at some point during interviews.

Homelessness and transience were major concerns for staff. Staff shared that some patients had actually been kicked out their home when family and roommates learned of their HIV status. To assist homeless patients, the clinic stored pill trays for those that were able to come to the clinic on a daily basis. Transience was an issue for patients that were unstably housed, moved locations, and changed phone numbers often.

While the clinic had housing coordination services in place, these services required

patients to present documents, such as photo identification and Social Security cards.

Without these documents, staff were unable to link patients to certain services and could

only provide guidance around how to obtain these documents and follow up accordingly.

Staff 3 described how some patients did not have basic identification and documents:

> And as I mentioned earlier, the application process is kind of cumbersome, the documents that are required, birth certificates, photo ID, Social Security cards, clients often don't have. Then they have to go out and do the leg work to get the documents to complete the application. So in that circumstance, if someone is in the process of doing a supportive housing application, then there is a lot of follow-up (interview, June 10, 2015).

In addition to unstable housing, many patients could not afford adequate food.

"For the majority of patients that I see, they don't even know what they have to eat

tomorrow or whether they have a place to live [and] some of them cannot even read"

(Staff 8 interview, June 16, 2015). Patients with the most serious issues were referred to a

case manager. The case manager's role was to provide service coordination beyond what

the PCP was able to provide. Staff 6 explained which patients are referred to case

management:

> Well, we do have case management. And that's another thing. I didn't mention that, but if they are having serious social, financial problems at the moment, like they need housing or they don't have enough food, or their food stamps just got turned off, or whatever it is, then I would, maybe on the first day, refer them also for case management to get that started. (interview, July 9, 2015)

Language was another barrier to care for many patients. Staff 8 explained, "I see a

lot of Africans from North Africa, you know they speak French, I see a lot of

Vietnamese, and I see a few of Hispanics" (interview, June 16, 2015). Patients who did

not speak English were unable to communicate with providers that did not speak the

same language. The clinic staffed a Spanish translator and for other languages used a

phone translator. While, overall, this was an effective solution a provider noted it could be uncomfortable for patients when speaking about sensitive issues, such as sexual activity.

Transportation was also barrier to care for many patients. This appeared to be one of the more straightforward issues for this clinic to address. Patients that had transportation issues were routinely provided public transportation vouchers.

Research Question 3

My third research question was the following: *What are the Johns Hopkins Primary Care Assessment Tool (PCAT) mean scores for each medical home domain for patient and staff groups?* In June and July of 2015, patients and staff completed the PCAT survey, which measures the four domains related to the medical home: First Contact (Access and Utilization domains), Ongoing Care, Coordinated Care (Services and Information Systems domains), and Comprehensive Care (Services Available and Services Provided domains). Twenty patients completed the Adult PCAT and were randomly sampled from exam rooms by clinicians after the end of the visit so as to not disturb care. Sixteen staff completed an online version of the Provider PCAT.

With the exception of the Ongoing Care domain, the primary PCAT domains are each divided into two subdomains: First Contact Access and First Contact Utilization, Coordination of Services and Coordination of Information Systems, and Comprehensive Services Available and Comprehensive Services Provided. PCAT items have a 4-point Likert response scale (definitely not = 1, probably not = 2, probably = 3, definitely = 4). With a possible score range from 1 to 4, higher mean domain scores indicate the medical home characteristic is more likely to be in place at the clinic. Mean PCAT domain scores

for patient and staff groups were calculated by summing Likert scales for each participant, as outlined in the PCAT manual (Starfield & Shi, 2009), then calculating overall domain averages. Summated Likert scales are typically treated as normally distributed data, and this assumption was tested. Because of the small sample sizes, I used the Shapiro-Wilkes normality test, and all domain's summated Likert scales were normally distributed with $W > .9$ and $p > .05$. Results from patient and staff groups are described separately below.

Patient PCAT survey results. Patient PCAT survey results are described below. Mean and Standard Deviation statistics are provided in Table 10.

First contact domains. The PCAT domain First Contact Utilization refers to the patients' use of a PCP for general health checkups, new health problems, and referrals to specialists. The First Contact Accessibility domain refers to the availability of same day appointments and phone advice from a PCP, during and after office hours, when a patient

Table 10

Patient PCAT Survey Data Mean Scores and Standard Deviations

Domain	Prior *M*	Prior *SD*
First Contact-Access	2.68	0.57
First Contact-Utilization	3.27	0.38
Ongoing Care	3.19	0.31
Coordination-Services	3.10	0.48
Coordination-Info Systems	2.64	0.37
Comprehensiveness-Services Available	3.06	0.32
Comprehensiveness-Services Provided	3.01	0.28

Note. n = 20.

is sick. The First Contact Utilization domain had a higher mean score than the First Contact Access domain.

Ongoing care domain. The PCAT's Ongoing Care domain refers to the provision of care at the same clinic and by the same PCP. Ongoing Care also refers to how well providers know patients and the problems most important to them. The Ongoing Care domain mean score was one of the highest domain scores for the patient PCAT survey results.

Coordination domains. The PCAT's Coordination of Services domain refers to the PCP's provision of referrals for specialty services, assistance making specialist appointments, and communication between the PCP and patient about appointments with specialists. The Coordination of Information services domain refers to patient access to medical records. The Coordination of Services domain had a higher mean score than Coordination of Information Systems domain.

Comprehensive care domains. The PCAT's Comprehensive Service Availability domain refers to the availability of immunizations, family planning, mental health counseling, and care for minor injuries at the PCP. The Comprehensive Services Provided domain refers to PCP discussions with patients about nutrition, exercise, home safety, family conflicts, and medications. Comprehensive Service Availability and Comprehensive Services Provided had similar mean scores.

Staff PCAT survey results. Patient PCAT survey results are described below. Mean and standard deviation statistics are provided in Table 11.

First contact domains. The PCAT domain First Contact Accessibility refers to the availability of same-day appointments and phone advice from a PCP, during and after

Table 11

Staff PCAT Survey Data Mean Scores and Standard Deviations

Domain	Prior *M*	Prior *SD*
First Contact-Access	2.47	0.46
Ongoing Care	3.31	0.60
Coordination-Services	2.95	0.68
Coordination-Info Systems	3.22	0.54
Comprehensiveness-Services Available	3.13	0.56
Comprehensiveness-Services Provided	3.21	0.57

Note. $n = 16$.

office hours, when a patient is sick. The First Contact Access domain mean score was the lowest of all staff PCAT domains. There is not a First Contact Utilization domain for the staff version of the PCAT.

Ongoing care domain. The PCAT's Ongoing Care domain refers to the provision of care at the same clinic and by the same PCP. Ongoing Care also refers to how well providers know patients and the problems most important to them. The Ongoing Care domain mean score was the highest of all staff PCAT domain scores.

Coordination domains. The PCAT's Coordination of Services domain refers to the PCP's provision of referrals for specialty services, assistance making specialist appointments, and communication between the PCP and patient about appointments with specialists. The Coordination of Information services domain refers to patient access to medical records and the use of lab test result flow charts, problem lists, and medication lists in medical records. The Coordination of Information Systems domain had a slightly higher mean score than the Coordination of Services domain.

Comprehensive care domains. The PCAT's Comprehensive Service Availability domain refers to the availability of immunizations, family planning, mental health counseling, and care for minor injuries from the PCP. The Comprehensive Services Provided domain refers to PCP discussions with patients about nutrition, exercise, home safety, family conflicts, and medications. The Comprehensive Services Provided domain had a slightly higher mean score than the Comprehensive Services Available domain.

Research Question 4

My fourth research question was the following: *What are patient and staff posterior means for each medical home domain? How do prior means influence posterior means? How do patients' posterior means compare to staffs' posterior means?* This question addressed the combined impact of subjective priors, based on interview data, and survey data on posterior estimates for constructs underlying medical home domains. I summarize results for patient and staff groups separately.

For this question I used Equation 2 to calculate posteriors for each domain with a normal distribution and known variance using the below equation. The known variances for each domain were taken from historical provider (n = 12) and patient (n = 98) PCAT surveys collected at the clinic for a previous study. The implicit sample size is represented by n_o, μ is the mean of the prior, *m* is the observed data sample size, and y_m is the observed data mean (Spiegelhalter, 2004).

$$p(\theta|y_m) = N\left[\theta \Big| \frac{n_0\,\mu + my_m}{n_0 + m}, \frac{\sigma^2}{n_o + m}\right] \tag{2}$$

In summary, the posterior distribution is normal and has a mean of $\frac{n_0\,\mu+my_m}{n_0+m}$ and a

variance of $\frac{\sigma^2}{n_o+m}$. The credible interval for the posterior is shown in Equation 3

(Spiegelhalter, 2004).

$$C.I. = \bar{y} \pm 1.96 \times \frac{\sigma}{\sqrt{n_0+m}} \tag{3}$$

Patient posterior means. For the patient group, prior mean scores that I assigned

for each domain were higher than the PCAT mean score. In some cases, this was

marginal as it was for the Coordination of Information Systems domain. In most cases,

the prior mean score was higher than the data mean score because interview data

explained how the PCAT underestimated medical home care characteristics of the clinic.

Table 12 summarizes patient means and standard deviations for the prior, data, and

posterior for each domain.

First Contact Access domain posterior. First contact access refers to the avail-

ability of appointments and advice during and after office hours. The First Contact

Access domain's prior mean score was slightly higher than the PCAT data mean score for

this domain; this resulted in a minimally higher posterior mean score compared to the

data. The implicit sample size calculated for this domain was $n_0 = 7.34$. Overall, the First

Contact Access domain had the second lowest prior, data, and posterior mean scores out

of all domains. The interview data used to estimate the prior confirmed PCAT survey

results and both revealed that while the clinic had accessible appointments for most

services and advice from a PCP during office hours, there were no appointments or

advice lines available to patients after hours. However, during interviews some patients

explained that they had their PCP's phone number and the PCP would call the patient

Table 12

Patient Prior, Data, and Posterior Mean Score, Standard Deviation, and Credible Interval

Domain	Prior M (SD)	Data M (SD)	Posterior M (SD)	Posterior 95% C.I.
First Contact-Access	2.80 (0.31)	2.68 (0.57)	2.71 (0.16)	2.40 to 3.03
First Contact-Utilization	3.93 (0.21)	3.27 (0.38)	3.55 (0.14)	3.28 to 3.81
Ongoing Care	3.65 (0.34)	3.19 (0.31)	3.24 (0.11)	3.03 to 3.45
Coordination-Services	3.38 (0.40)	3.10 (0.48)	3.15 (0.16)	2.83 to 3.46
Coordination-Info Systems	2.70 (0.11)	2.64 (0.37)	2.68 (0.09)	2.50 to 2.86
Comprehensiveness-Available	3.65 (0.13)	3.06 (0.32)	3.46 (0.11)	3.25 to 3.67
Comprehensiveness-Provided	3.42 (0.15)	3.01 (0.28)	3.21 (0.10)	3.00 to 3.41

Note. Prior *n* = 10. Data *n* = 20.

back quickly with advice, which explains why some PCAT survey participants had access to after-hours advice while others did not. While there was not a formal mechanism of obtaining after-hours advice, some patients could nonetheless contact their PCP. This nuance was not captured by the PCAT and only became clear from the interview data. The prior and data mean scores are similar for this domain and therefore the posterior mean score is very close to that of the data mean score. Out of a possible score range of 1 to 4, a posterior mean score of *M* = 2.71 is closest to the Likert scale rating of 3 which is a rating of "probably." This indicates that some, but not all, services and advice are accessible.

First Contact Utilization domain posterior. First contact utilization refers to the patient's consistent use of a provider for primary care, preventative care, and for acute

health issues. The First Contact Utilization domain's prior mean score was quite a bit higher than the PCAT data mean score for this domain, which resulted in a moderately higher posterior mean score compared to the data. The implicit sample size calculated for this domain was $n_0 = 14.51$. This domain had the highest prior, data, and posterior mean scores out of all domains. During interviews, patients consistently remarked that they used the clinic as a first-line source of medical care which was slightly different from what the PCAT data indicated. Some patients went as far as to utilize his or her PCP to consult with the provider before travelling or making other plans, which was not captured by the PCAT. Unlike interviews, the PCAT does not capture if a provider at the clinic other than the patient's PCP, such as a psychiatrist or case manager, is the patient's preferred and utilized provider for new health issues. For this reason, the prior mean score for this domain is higher than that of the data. In turn, this resulted in a higher posterior mean score that I believe better reflects utilization of services at the clinic compared to the survey data alone. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.55$ is closest to the Likert scale rating of 4 which is a rating of "definitely." This indicates that patients utilize the clinic for nearly all healthcare needs.

Ongoing Care domain posterior. Ongoing care refers to the provision of care at the same clinic and by the same providers on a consistent basis. Ongoing care also refers to how well providers know patients and the problems that are important to them. The Ongoing Care domain's prior mean score was somewhat higher than the PCAT data mean score for this domain. The implicit sample size was $n_0 = 2.25$ and the posterior mean score for this domain was only slightly higher than that of the data. This domain was tied for the second highest prior mean score, was the second highest data mean score,

and was the third highest posterior mean score out of all domains. The majority of interview participants indicated they regularly saw the same PCP, or a provider working with that PCP, and had consistent providers for other services such as psychiatry and case management. Interview data also revealed that patients had close personal relationships with providers who they felt had their best interest at heart. The PCAT does not account for teams of providers that work with patients consistently, which may resulted in a lower PCAT mean score compared to the prior for this domain. Because of this and interview participants' detailed explanations of personal relationships with providers, I assigned a higher prior mean to this domain compared to the data. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.24$ is closest to the Likert scale rating of 3 which is a rating of "probably." This indicates that patients are likely to receive care at the clinic on a consistent and longitudinal basis.

Coordination of Services domain posterior. Coordination of services refers to the provision of referrals for specialty services, assistance making specialist appointments, and communication between the PCP and patient about appointments with specialists. The Coordinated Services domain's prior mean score was somewhat higher than the PCAT data mean score for this domain; however, the posterior mean score for this domain is only slightly higher than that of the data. The implicit sample size for this domain was $n_0 = 3.80$. This domain had one of the lowest prior, data, and posterior mean scores out of all domains but still had a relatively high mean score on the 4 point scale. Interview data revealed that the services at the clinic were typically coordinated either by a PCP, case manager, or other provider. This somewhat differs from what the PCAT captures, which is coordination of services by the PCP. Furthermore, the PCAT does not

capture new patient education sessions, which is a unique service coordinated for patients at the clinic to help them understand the services available and how they may qualify for those services. For this reason, I assigned a slightly higher prior mean score for Coordination of Services compared to the PCAT mean score. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.15$ is closest to the Likert scale rating of 3 which is a rating of "probably." This indicates that patients are likely, but not certain, to have coordinated services and appointments.

　　Coordination of Information Systems domain posterior. Coordination of information-tion systems refers to patient access to medical records. The Coordination of Information Systems domain's prior mean score was only marginally higher than the PCAT data mean score for this domain; therefore, the posterior mean score for this domain is similar to that of the data. The implicit sample size calculated for this domain was $n_0 = 42.84$. This domain had the lowest prior, data, and posterior mean scores out of all domains. Interview data revealed that patients have access to medical records via a patient portal, but most patients are unable to utilize the system because they do not have internet access at home. Interview data explain the lower Coordination of Information Systems domain score in a way that the PCAT was unable to capture. Access to medical records is only useful to patients if they can use the system. Out of a possible score range of 1 to 4, a posterior mean score of $M = 2.68$ is closest to the Likert scale rating of 3 which is a rating of "probably." However, I estimate that this score better reflects the Likert scale rating of 2 which is a rating of "probably not" because most patients cannot access the system put in place.

Comprehensive Services Available domain posterior. Comprehensive Service Availability refers to the availability of services for a variety of preventative, acute, and chronic conditions. The Comprehensive Services Available domain's prior mean score was quite a bit higher than the PCAT data mean score for this domain, which resulted in a moderately higher posterior mean score compared to the data. The implicit sample size calculated for this domain was $n_0 = 42.72$. This domain tied for the second highest prior mean score, had the fourth highest data mean score, and the second highest posterior mean scores out of all domains. Interview data revealed more services were available than the PCAT captured; the PCAT survey does not address all the services patients described during interviews. For example, substance abuse counseling, transportation assistance, housing assistance, and dental care are not addressed by the PCAT. Further-more, PCAT terminology may not be familiar to patients with low health literacy. For example, interview participants described the availability of birth control in the form of condoms and hormonal contraceptives yet not all survey respondents checked that family planning was definitely available at the clinic. The term family planning may not be recognized by patients as the availability of birth control methods. Because of these findings from the interview data, I assigned a moderately higher prior mean score to the Comprehensive Services Available domain compared to the PCAT data mean for this domain. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.46$ is squarely in between the Likert scale rating of 3, which is a rating of "probably," and 4, which is a rating of "definitely." I estimate that this score better reflects the Likert scale rating of "definitely" based on the variety of services described during interviews and the

possibility that the PCAT survey uses terminology unfamiliar to patients with low health literacy levels. In summary comprehensive services are available to patients at the clinic.

Comprehensive Services Provided domain posterior. The Comprehensive Services Provided domain refers to services actually delivered to patients. The Comprehensive Services Provided domain's prior mean score was quite a bit higher than the PCAT data mean score for this domain, which resulted in a moderately higher posterior mean score compared to the data. The implicit sample size calculated for this domain was $n_0 = 18.78$. This domain had the fourth highest prior mean score, the fifth highest data mean score, and the fourth highest posterior mean scores out of all domains. Even though these mean scores ranked lower in comparison to other domains, they were still relatively high on the 4 point scale. The reason for assigning a higher prior mean score to this domain than the data mean score is the same as the justification provided for the Comprehensive Services Available domain. However, the Comprehensive Services Provided domain's posterior mean score is slightly lower than that of the Comprehensive Services Available because patients do not necessarily take advantage of all services available or they may not qualify for every service. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.42$ is between the Likert scale rating of 3, which is a rating of "probably," and 4, which is a rating of "definitely." This indicates that comprehensive services are likely provided to patients.

Influence of prior data on posterior mean scores. Table 13 shows the prior, data, and posterior mean scores for each domain listed in descending order of the posterior. Reviewing the posterior mean scores in descending order shows that the prior did indeed influence the ranking of posterior mean scores in some cases. For example, the

Table 13

Patient Prior, Data, and Posterior Rank Order, Mean Score, Standard Deviation , and Credible Interval Sorted in Descending Order

Domain	Prior M (SD)	Data M (SD)	Posterior M (SD)	95% C.I.
First Contact-Utilization	3.93 (0.21)	1 - 3.27 (0.38)	1 - 3.55 (0.14)	3.28 to 3.81
Comprehensiveness-Available	3.65 (0.13)	4 - 3.06 (0.32)	2 - 3.46 (0.11)	3.25 to 3.67
Ongoing Care	3.65 (0.34)	2 - 3.19 (0.31)	3 - 3.24 (0.11)	3.03 to 3.45
Comprehensiveness-Provided	3.42 (0.15)	5 - 3.01 (0.28)	4 - 3.21 (0.10)	3.00 to 3.41
Coordination-Services	3.38 (0.40)	3 - 3.10 (0.48)	5 - 3.15 (0.16)	2.83 to 3.46
First Contact-Access	2.80 (0.31)	6 - 2.68 (0.57)	6 - 2.71 (0.16)	2.40 to 3.03
Coordination-Info Systems	2.70 (0.11)	7 - 2.64 (0.37)	7 - 2.68 (0.09)	2.50 to 2.86

Note. Prior *n* = 10. Data *n* = 20.

Comprehensive Services Available domain has the second highest posterior mean score but the third highest data mean score. For the Comprehensive Services Available domain the influence of the prior increased the ranking of this domain's mean score from third to second place. Additionally, the Comprehensive Services Provided domain has the fourth highest ranked posterior mean score but the fifth highest data mean score. The Comprehensive Services Provided domain was also moved up one ranking from fifth to fourth place due to the influence of the prior. For all domains the posterior variance is smaller than that of the data because of the additional information provided by the case study interviews.

Staff posterior means. For the staff group, prior mean scores I assigned for each domain were higher than the PCAT mean scores. The increase was marginal for three

domains--Ongoing Care, Coordination of Services, and Comprehensive Services

Provided. In other cases, the prior mean score was higher than the data mean score for

reasons I discuss below. Table 14 summarizes staff means and standard deviations for the

prior, data, and posterior for each domain.

First Contact Access domain posterior. First contact access refers to the avail-

ability of appointments and advice during and after office hours. The First Contact

Access domain's prior mean score was moderately higher than the PCAT data mean

score for this domain; this resulted in a slightly higher posterior mean score compared to

the data. The implicit sample size calculated for this domain was $n_0 = 5.10$. Overall, the

First Contact Access domain had the lowest prior, data, and posterior mean scores out of

Table 14

Staff Prior, Data, and Posterior Mean Score, Standard Deviation, and Credible Interval

Domain	Prior M (SD)	Data M (SD)	Posterior M (SD)	95% C.I.
First Contact-Access	2.84 (0.27)	2.47 (0.46)	2.56 (0.13)	2.30 to 2.82
Ongoing Care	3.34 (0.63)	3.31 (0.60)	3.31 (0.12)	3.08 to 3.54
Coordination-Services	3.31 (0.29)	2.95 (0.68)	3.03 (0.14)	2.76 to 3.31
Coordination-Info Systems	3.40 (0.47)	3.22 (0.54)	3.23 (0.10)	3.03 to 3.42
Comprehensiveness-Available	3.38 (0.23)	3.13 (0.56)	3.17 (0.09)	2.99 to 3.34
Comprehensiveness-Provided	3.25 (0.46)	3.21 (0.57)	3.21 (0.14)	2.95 to 3.48

Note. Prior *n* = 8. Data *n* = 16.

all domains. Both interview and PCAT data revealed that while the clinic had accessible services and advice from a PCP during office hours, there were no appointments or advice lines available to patients after hours. However, two clinical providers indicated that their patients had their cell phone numbers and that they would return phone calls from patients after hours. Out of a possible score range of 1 to 4, a posterior mean score of $M = 2.56$ is in between a Likert rating of 2 "probably not" and 3 "probably." This indicates that only some services and advice are accessible.

Ongoing Care domain posterior. Ongoing care refers to the provision of care at the same clinic and by the same providers on a consistent basis. Ongoing care also refers to how well providers know patients and the problems important to them. The Ongoing Care domain's prior mean score was essentially the same as the PCAT data mean score for this domain; therefore, the posterior mean score for this domain is unchanged. The implicit sample size calculated for this domain was $n_0 = .58$. This domain was the third highest prior mean score, was the highest data mean score, and was also the highest posterior mean score out of all domains. Most providers indicated that their patients saw them consistently. However, one PCP mentioned being on an in-patient rotation at the affiliated hospital 4 months out of the year. During that time, the provider is not in clinic so then another provider would see that provider's patients. All providers indicated they ask many open-ended questions to get to know patients well and described those questions in detail. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.31$ is closest to the Likert scale rating of 3, which is a rating of "probably." This indicates that providers are likely to deliver care to a consistent group of patient on a longitudinal basis.

Coordination of Services domain posterior. Coordination of services refers to the provision of referrals for specialty services, assistance making specialist appointments, and communication between the PCP and patient about appointments with specialists. The Coordinated Services domain's prior mean score was somewhat higher than the PCAT data mean score for this domain; however, the posterior mean score for this domain is only slightly higher than that of the data. The implicit sample size calculated for this domain was $n_0 = 4.87$. This domain had the third lowest prior, the second lowest data, and the second lowest posterior mean score out of all domains but still had relatively high mean scores on the 4-point scale. Interview data revealed that the services at the clinic were typically coordinated either by a PCP, case manager, or other provider that could include a housing coordinator, nutritionist, or a patient navigator. The PCAT does not capture the extent of services coordinated for patients, such as coordination of payment assistance for medications from pharmaceutical companies, assistance completing housing applications, and the provision of pill trays for patients with medication adherence issues. For this reason, I assigned a somewhat higher prior mean score for Coordination of Services compared to the PCAT mean score. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.03$ is closest to the Likert scale rating of 3, which is a rating of "probably." This indicates that providers are likely to coordinate most but not all services and appointments for patients.

Coordination of Information Systems domain posterior. For staff, the PCAT not only measures patient access to medical records but also the use of problem lists, lab test result flow charts, and medication lists in the medical record. The Coordination of Information Systems domain's prior mean score was somewhat higher than the PCAT

data mean score for this domain; however, the posterior mean score for this domain is similar to that of the data. The implicit sample size calculated for this domain was $n_0 =$ .76. This domain had the highest prior, second highest data, and second highest posterior mean scores out of all domains. Staff interview data did confirm that while an online patient medical record portal is available most patients do not access the portal. On the other hand, providers rely on the medical record system to document patient information extensively and to communicate with one another regularly to coordinate patient care. Staff confirmed that medication lists, problem lists, and lab result flow charts are consistently used in the medical record system. Furthermore, providers are able to see hospital stays for his or her patients admitted to the affiliated hospital emergency room or for scheduled services which keeps them informed about their patients. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.23$ is closest to the Likert scale rating of 3, which is a rating of "probably."

Comprehensive Services Available domain posterior. Comprehensive Service Availability refers to the availability of services for a variety of preventative, acute, and chronic conditions. The Comprehensive Services Available domain's prior mean score was somewhat higher than the PCAT data mean score; however, the posterior mean score was only slightly higher than the data. The implicit sample size calculated for this domain was $n_0 = 2.88$. This domain had the second highest prior mean score, the fourth highest data mean score, and the fourth highest posterior mean scores out of all domains. Interview data revealed far more services were available than what the PCAT captured. For example, the clinic has a radiology department, a hepatitis C clinic, and a palliative care team. Additionally, the clinic has an arrangement with the affiliated hospital and

several specialty providers, including a neurologist and a physical therapist, come to the clinic one day a week. Because of these findings from the interview data, I assigned a higher prior mean score to the Comprehensive Services Available domain compared to the PCAT data mean for this domain. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.17$ is closest to the Likert scale rating of 3, which is a rating of "probably." The score is likely closer to a rating of 3 than 4, which is "definitely," because some services have long wait times and patients that are on private insurance may not be eligible for all services.

Comprehensive Services Provided domain posterior. The Comprehensive Services Provided domain refers to services actually delivered to patients. The Comprehensive Services Provided domain's prior mean score was similar to the PCAT data mean score for this domain which resulted in the same posterior mean score as the data. The implicit sample size calculated for this domain was $n_0 = 1.54$. This domain had the second lowest prior mean score, the third highest data mean score, and third highest posterior mean scores out of all domains. Even though the data and posterior mean scores ranked lower in comparison to other domains, they were still relatively high on the 4-point scale. The reason for assigning a higher prior mean score to this domain than the data mean score is the same as the justification provided for the Comprehensive Services Available domain. Out of a possible score range of 1 to 4, a posterior mean score of $M = 3.21$ is closest to the Likert scale rating of 3, which is a rating of "probably." This indicates that comprehensive services are likely provided to patients.

Influence of prior data on posterior mean scores. Table 15 shows the prior, data, and posterior mean scores for each domain listed in descending order of the posterior.

Table 15

Staff Prior, Data, and Posterior Rank Order, Mean Score, Standard Deviation, and Credible Interval Sorted in Descending Order

Domain	Prior M (SD)	Data M (SD)	Posterior M (SD)	95% C.I.
Ongoing Care	3.34 (0.63)	1 - 3.31 (0.60)	1- 3.31 (0.12)	3.08 to 3.54
Coordination-Info Systems	3.40 (0.47)	2 - 3.22 (0.54)	2 - 3.23 (0.10)	3.03 to 3.42
Comprehensiveness-Provided	3.25 (0.46)	3 - 3.21 (0.57)	3 - 3.21 (0.14)	2.95 to 3.48
Comprehensiveness-Available	3.38 (0.23)	4 - 3.13 (0.56)	4 - 3.17 (0.09)	2.99 to 3.34
Coordination-Services	3.31 (0.29)	5 - 2.95 (0.68)	5 - 3.03 (0.14)	2.76 to 3.31
First Contact-Access	2.84 (0.27)	6 - 2.47 (0.46)	6 - 2.56 (0.13)	2.30 to 2.82

Note. Prior $n = 8$. Data $n = 16$.

Reviewing the posterior mean scores in descending order shows that the prior did not influence the ranking of any staff posterior mean scores. For all domains, the posterior variance is smaller than that of the data because of the additional information provided by the prior.

  Bayesian sensitivity analysis. A sensitivity analysis tests the robustness of results to the assumptions associated with the analysis (Borenstein, et al., 2009; Ntzoufras, 2009). For a Bayesian study, a sensitivity analysis tests the posterior's robustness to the assumptions of the Bayesian model. For my study, the Bayesian analysis used the implicit *n* to weight the prior and data in the posterior. To test the robustness of the posterior to the weighting technique, I conducted the Bayesian analysis and weighted the prior and the data equally. Weighting the prior equally reflected my belief as the expert that that prior sample size was equal to that of the data. This belief was assumed only for

the purpose of demonstrating the change in influence of the prior on the posterior when weighting the prior equally to the data versus weighting based on the implicit *n*. Bolstad (2004) stated that the posterior distribution reflects "the relative weights we give to each parameter value after analyzing the data" (p. 6) and this sensitivity analysis reflects a variation on determining the relative weights. The results of the sensitivity analysis are presented in Table 16.

Patient sensitivity analysis. In the patient sensitivity analysis, two domains' posterior mean scores increased their rank when the prior and data were weighted equally versus weighting by the implicit *n*. Specifically, the Comprehensive Services Available domain was changed from the 2nd highest to the 3rd highest domain, and the Coordination-Services domain rose from 5th to 4th. Most notably, all posterior domain mean scores, where the prior and data were weighted equally, were within the confidence intervals calculated for the posterior domain mean scores where the prior and data were weighted by the implicit n. In summary, the assumption of how the prior and data were weighted was robust in the Bayesian model.

Staff sensitivity analysis. In the staff sensitivity analysis, only one domain's posterior mean score had a change in ranking when the prior and data were weighted equally versus weighting by the implicit n. Specifically, the Comprehensive Services Available domain was changed from the fourth highest to the third highest domain. Most notably, all posterior domain mean scores, where the prior and data were weighted equally, were within the confidence intervals calculated for the posterior domain mean scores where the prior and data were weighted by the implicit *n*. In summary, the assumption of how the prior and data were weighted was robust in the Bayesian model.

Table 16

Sensitivity Analysis of Posteriors: Prior and Data Waited Equally Versus Weighted by Implicit n

| Domain | Weighted Equally | | Weighted by Implicit *n* | | |
	Rank Order	M (SD)	Rank Order	M (SD)	95% C.I.
Patient Posteriors (Prior *n* = 10, Data *n* = 20)					
First Contact-Utilization	1	3.60 (0.14)	1	3.55 (0.14)	3.28 to 3.81
Comprehensiveness-Available	3	3.35 (0.11)	2	3.46 (0.11)	3.25 to 3.67
Ongoing Care	2	3.42 (0.11)	3	3.24 (0.11)	3.03 to 3.45
Comprehensiveness-Provided	5	3.22 (0.10)	4	3.21 (0.10)	3.00 to 3.41
Coordination-Services	4	3.24 (0.16)	5	3.15 (0.16)	2.83 to 3.46
First Contact-Access	6	2.74 (0.16)	6	2.71 (0.16)	2.40 to 3.03
Coordination-Info Systems	7	2.67 (0.09)	7	2.68 (0.09)	2.50 to 2.86
Staff Posteriors (Prior *n* = 8, Data *n* = 16)					
Ongoing Care	1	3.33 (0.12)	1	3.31 (0.12)	3.08 to 3.54
Coordination-Info Systems	2	3.31 (0.10)	2	3.23 (0.10)	3.03 to 3.42
Comprehensiveness-Provided	4	3.23 (0.14)	3	3.21 (0.14)	2.95 to 3.48
Comprehensiveness-Available	3	3.26 (0.09)	4	3.17 (0.09)	2.99 to 3.34
Coordination-Services	5	3.13 (0.14)	5	3.03 (0.14)	2.76 to 3.31
First Contact-Access	6	2.65 (0.13)	6	2.56 (0.13)	2.30 to 2.82

Comparison of patient and staff posteriors. Six of seven patient posterior domain mean scores were compared to staff posterior domain mean scores. There is not a First Contact-Utilization domain for the Provider PCAT, so this domain was not compared for the two groups. Four of the six domains had patient posterior mean scores that were somewhat higher than the staff posterior mean scores. For one domain, the staff posterior was moderately higher than the patient posterior. For another domain the patient and staff

posterior mean scores were exactly the same. Table 17 summarizes patient and staff posterior mean scores for each domain.

First Contact Access domain posteriors. First contact access refers to the availability of appointments and advice during and after office hours. The First Contact Access domain's posterior mean score for patients was higher than that of the staff group. The First Contact Access domain had the second lowest and lowest posterior domain mean scores for the patient and staff groups respectively. Overall, the First Contact Access domain posteriors for patient and staff groups were very similar and closest to the Likert rating of "probably"; however, the staff posterior mean was squarely between the rating of "probably not" and "probably." Both patients and staff revealed that while the

Table 17

Patient and Staff Rank Order, Means, and 95% Credible Intervals

Domain	Patient Posterior			Staff Posterior		
	Rank Order	M (SD)	95% C.I.	Rank Order	M (SD)	95% C.I.
First Contact-Access	5	2.71 (0.16)	2.40 to 3.03	6	2.56 (0.13)	2.30 to 2.82
Ongoing Care	2	3.24 (0.11)	3.03 to 3.45	1	3.31 (0.12)	3.08 to 3.54
Coordination-Services	4	3.15 (0.16)	2.83 to 3.46	5	3.03 (0.14)	2.76 to 3.31
Coordination-Info Systems	6	2.68 (0.09)	2.50 to 2.86	2	3.23 (0.10)	3.03 to 3.42
Comprehensiveness-Available	1	3.46 (0.11)	3.25 to 3.67	4	3.17 (0.09)	2.99 to 3.34
Comprehensiveness-Provided	3	3.21 (0.10)	3.00 to 3.41	3	3.21 (0.14)	2.95 to 3.48

clinic had accessible services and advice from a PCP during office hours, there were no appointments or advice lines available to patients after hours. Some patients shared that they had their PCP's or psychiatrist's cell phone number and could reach them after hours. Two PCPs, not necessarily the same PCPs that patients referred to, confirmed that their own patients had his or her cell phone number. Patient and staff posterior mean score confidence intervals overlap.

Ongoing Care domain posteriors. Ongoing care refers to the consistent provision of care by the same providers and how well providers know patients. The Ongoing Care domain's prior mean score for patients was slightly lower than that of the staff group. This domain had the second highest and highest posterior domain mean scores for patient and staff groups respectively. Overall, the Ongoing Care domain posteriors for patient and staff groups were very similar and closest to the Likert rating of "probably." Patients and providers mostly echoed one another and indicated patients were seen by the same providers consistently. However, a couple of staff shared that their rotations at the parent hospital took them out of the clinic for several weeks out of the year. During those times, their patients would be unable to see their usual providers.

Coordination of Services domain posteriors. Coordination of services is the provision of referrals for specialty services, assistance making specialist appointments, and communication about specialist appointments. The Coordination of Services domain's prior mean score for patients was slightly higher than that of the staff group. This domain had the fourth and fifth lowest posterior domain mean scores for patient and staff groups respectively. Overall, the Coordination of Services domain posteriors for patient and staff groups were very similar and closest to the Likert rating of "probably."

Patient and staff interview data revealed more service coordination from PCPs, case managers, or other providers than the PCAT could capture.

Coordination of Information Systems domain posteriors. For patients, the PCAT measures access to medical records. For staff, the PCAT not only measures patient access to medical records but also the use of problem lists, lab test result flow charts, and medication lists in the medical record. The difference in information captured for the two groups explains the large gap in posterior domain scores for the groups. The Coordination of Information Systems domain's prior mean score for patients was much lower than that of the staff group. This domain had the lowest and second highest posterior domain mean scores for patient and staff groups respectively. Despite the differences in scores, the Coordination of Services domain posteriors for patient and staff groups were both closest to the Likert rating of "probably." Staff interview data did confirm that while an online patient medical record portal is available, most patients do not access the portal. On the other hand, providers used the electronic medical record extensively to document services, track labs, communicate with other providers about patient concerns, follow-up concerning support or specialist services provided to patients, and check medications and problem lists.

Comprehensive Services Available domain posterior. Comprehensive Service Availability refers to the availability of services for a variety of preventative, acute, and chronic conditions. The Comprehensive Services Available domain's prior mean score for patients was moderately higher than that of the staff group. This domain had the first highest and fourth highest posterior domain mean scores for patient and staff groups respectively. Despite the moderate differences in the groups posterior mean scores, the

Comprehensive Services Available domain posteriors for patient and staff groups were very similar and closest to the Likert rating of "probably." Patient and staff interview data revealed that far more comprehensive services were provided than the PCAT captured because of the many support services provided and specialist services offered onsite because of the clinic's affiliation with a larger parent hospital through weekly onsite arrangements with specialty providers. The staff score may have been lower because, as providers, staff were aware of more services that potentially can be available for patients.

Comprehensive Services Provided domain posterior. The Comprehensive Services Provided domain refers to services delivered to patients in actual practice. The Comprehensive Services Provided domain's prior mean score for patients was the same as that of the staff group. This domain had the third highest posterior mean scores for both groups.

Study validity

Yin (2009) primarily focused on construct validity for case studies. Construct validity as it pertains to case studies generally and for this study in particular is detailed in Chapter 3 on page 52. To assess construct validity for this study data were collected using interviews and surveys and these data were compared. This chapter outlined a comparison of interview and survey data and described possible sources of differences between interview and survey results. For this study interview and survey data results were similar within participant groups.

While not a large focus of case study research, Yin (2009) described case study external validity as it relates to theoretical or analytical generalization. Selection of the case is important for theoretical generalization and that is why I selected a case typical of

large urban RWP clinics (Beane, 2013). Results of this case study may be compared to other case studies of large urban RWP clinics. Results of this case study are not comparable to non-RWP clinics or clinics in rural areas. Decision makers should only use the results of this case study to inform decisions for RWP clinics with similar characteristics.

CHAPTER 5

DISCUSSION

The purpose of this research was to design and implement the BCSM to describe the extent to which a RWP-funded clinic provided care that aligned with the medical home model. The BCSM was implemented as a novel and rigorous approach to combining qualitative and quantitative data in the context of case study. The BCSM was based on a Bayesian mixed-method study framework developed by Curlette (2006), which I modified specifically for case study research. To implement the BCSM, I collected interview and survey data from patients and staff at the clinic. The interview data richly described care processes at the clinic, and these data were used to estimate priors for the Bayesian analysis. Survey data were collected using the PCAT survey. Priors were combined with survey results using Bayesian statistics. Together, the interview and survey data provided more detail about the case than one type of data alone. Furthermore, collecting both patient and staff data contributed to a holistic description of care at the clinic.

In this study, I found the BCSM to be a useful tool for formally integrating qualitative and quantitative case study data to describe a complex system. I also found that the clinic provided care that aligned with most medical home domains. Patient data described care that characterized the medical home model for five of seven domains and staff data described medical home care for five of six domains. The data collected for this study revealed relationships between medical home domains and highlighted the role of social determinants of health and the importance of patient provider relationships.

Development and Implementation of the BCSM

The first research question for this dissertation focused on designing the BCSM to combine qualitative and quantitative case study data using subjective priors and Bayesian statistics. The BCSM was used for this study to describe the extent to which the clinic in my case study provided medical home care. The BCSM was developed in response to a call for more systematic mixed-methods research (Dixon-Woods et al., 2001). Furthermore, this dissertation extended upon the work of Curlette (2006), which provided this study's framework for using Bayesian statistics to integrate qualitative and quantitative data, and also built upon two Bayesian mixed-method meta-analysis studies that focused on healthcare research (Roberts et al., 2002; Voils et al., 2009). Specifically, this dissertation addressed methodological issues illuminated by Zang and Creswell's (2013) systematic review that found many mixed-method healthcare studies failed to address how and why mixed-method procedures were selected to answer research questions, what specific procedures were used to integrate data, and how methods were linked.

Mixed-method procedures were selected for this dissertation because there was a need for both structured and flexible data collection tools. The PCAT is a survey tool developed by Johns Hopkins University for measuring medical home constructs (Shi et al., 2001). This type of data collection tool may be favored by government agencies and policy makers but is insufficient to describe complex processes. Interviews provided a flexible data collection method for eliciting detailed descriptive data that were not possible to collect using a survey. Collecting data using surveys and interviews and from patients and staff resulted in a comprehensive description of the case. As a result, this

study captured patient experiences and nuanced care delivery processes described by staff. To address how qualitative and quantitative data were linked and integrated, I outlined the process for coding qualitative interview data, detailed steps for assigning priors, and provided the Bayesian formula used to combine priors with data.

BCSM value added. The BCSM is an intuitive research method because case studies and Bayesian approaches are uniquely aligned. Both share a focus on description and convergence, are appropriate for research with small sample sizes, and are flexible enough to use mixed methods. The BCSM uses subjective priors, links data using Bayesian statistics, and results in posterior estimates which all add value over traditional mixed-method approaches.

Subjective priors are valuable because they can be used to describe a case from multiple viewpoints and include the beliefs of experts and layperson stakeholders. Subjective priors based on qualitative data provide more detailed information than directly eliciting a prior estimate from an expert, which is the more traditional Bayesian approach to subjective priors. During interviews, I did not ask questions about medical home domains but rather asked about experiences providing and receiving care. This resulted in more nuanced data than an expert's prior estimate and description of that estimate. Another benefit of this method is that the process of assigning prior ratings based on qualitative data forces the researcher to comprehensively conceptualize constructs in order to transfer the qualitative data to a numeric rating. This resulted in a deeper understanding of processes at the clinic in the context of the medical home model. Another benefit of the BCSM is that the method entails a detailed qualitative summary of

data collected for the subjective prior. This qualitative summary can be used to assess the quality of the data collected and how the findings may or may not relate to a similar case.

Another unique benefit of the BCSM is that it provides an explicit method for linking and integrating qualitative and quantitative data using Bayesian statistics. In the BCSM, the qualitative and quantitative methods and data are equally important and the prior can be weighted to reflect the researchers belief based on the qualitative data. For this study, the qualitative tool provided a flexible data collection method and the quantitative tool provided a scale for assigning priors to qualitative data. Specifically, I assigned prior scores, based on the PCAT's Likert rating scale, to each interview for each PCAT item. Then I used the PCAT's method of summating Likert scales to calculate a prior score for each domain. Once the qualitative data were transferred to numeric prior estimate Bayesian statistics were used to combine the prior and data. This process for formally combining the two types of data resulted in a posterior estimate that reflected both the prior and data using a transparent and systematic method.

Posterior estimates are convenient for decision makers that may not have time to read lengthy descriptive qualitative summaries. For example, in this study, seven medical home domains were described for patients and six domains were described for staff for a total of 13 qualitative summaries. In a busy healthcare setting, quality improvement staff can work efficiently by directing focus to reviewing qualitative summaries for domains with the lowest posterior estimates, indicating the greatest need for improvement.

Overall BCSM findings. The BCSM should satisfy both stakeholders looking for rich, descriptive data and those needing summary point estimates. The BCSM also fulfills a gap in the literature around systematic approaches to mixed-method healthcare research

that was identified by Zang and Creswell (2013). The BCSM is especially useful for mixed-method studies that require a flexible yet rigorous approach to describe complex systems. Furthermore, there is great potential to apply the BCSM to research on various types of organizations and systems including but not limited to healthcare settings.

The Medical Home Model in a RWP HIV Setting

Three research questions focused on describing and measuring medical home domains at the clinic from the perspective of patients and staff. This study fleshed out some of the limitations of existing medical home research, such as an exploratory study of the medical home in RWP funded clinics (Beane et al., 2013) and a study that indirectly measured medical home care characteristics in RWP clinics (Valverde et al., 2004). Using the BCSM approach, I was able to make meaning of the qualitative data in a way the aforementioned studies did not. Making meaning of qualitative data pertains to insights from the data beyond reporting the data and results (Hunter, Lusardi, Zucker, Jacelon, & Chandler, 2002). Hunter et al. (2002) discussed processes for making meaning of qualitative health research data and described conceptual models and maps as a way to show relationships between variables.

Reflecting upon the results, I concluded that medical home domains comprised a system of interdependent variables and that contextual factors related to social determinants of health greatly influenced those variables. Medical home domains are interdependent because care exemplary of each medical home domain is supported by successful implementation of other medical home domains. For example, the First Contact-Utilization domain, which pertains to patient use of the medical home as a first line source of care, is supported by both the availability of comprehensive services and

coordination of those services. In turn, First Contact-Utilization is supportive of the Ongoing Care domain.

Conceptual model of medical home domain relationships. I created a conceptual model of medical home domains to describe how interdependency between domains influenced the care process. The model is based on my analysis of qualitative data collected during interviews and is not representative of a statistical model. Particularly the qualitative data in this study revealed information that could not be captured by a quantitative tool. The model resulting from the qualitative data embodies a major tenet of Von Bertalanffy's (1968) GST, which was the theoretical framework for this study. GST posits that systems are an integrated whole instead of the sum of isolated parts that function independently. In GST, system elements influence and rely upon one another for efficiency. From my qualitative data, it was evident that, in the RWP clinic, the way that medical home domains were related was influenced by social determinants of health (SDH) and patient-provider relationships. Medical homes were built around the concept of emphasizing the patient's illness experience and patient-provider relationships while incorporating the patient's psychosocial context into primary care and disease management (Ford, 2004). The qualitative data collected for this study confirmed this but also illuminated the role of SDH in the HIV medical home. The Centers for Disease Control and Prevention (2015) defines SDH as conditions where people live that influence health outcomes. SDH include income and access to resources, such as education, healthcare, food, and transportation. SDH also include but are not limited to language, social support, and neighborhood safety. I found that among a patient population with poor SDH, the patient provider relationship is extremely important.

Figure 2 depicts the conceptual model of medical home domains and highlights the interdependency between domains and where patient-provider relationships and social determinants of health play a particularly large role in the provision of medical home care. The conceptual model starts in the upper left hand corner where patients enter

First Contact Access
Need for primary and HIV care is cause for patients entering the medical home. Primary and HIV care should be accessible initially and over time as *Ongoing Care* is provided.

Due to SDH this may be the patient's 1st experience accessing primary care.

Comprehensive Services Available
Available services include clinical and support services. *First Contact Access* is necessary for patients to enter the medical home and see a provider knowledgeable of available services.

Due to SDH comprehensive care including support services are made available.

Coordinated Services
The *Comprehensive Services Available* are coordinated so patients can successfully navigate clinical and support services.

Due to SDH patients may have little experience navigating healthcare systems and benefit from service coordination.

Coordinated Information Systems
Use of electronic medical records facilitates care coordination.

Ongoing Care
First Contact Utilization and *Comprehensive Services Provided* results in continuous care and long-term patient-provider relationships.

In a medical home with support services that address SDH there is greater incentive for providers to form relationships with patients so they can learn of patient's needs and then *Coordinate Services* to meet patient's needs.

Comprehensive Services Provided
As a result of *First Contact Utilization*, comprehensive services are provided.

SDH create a need for the provision of comprehensive care including support services.

First Contact Utilization
Accessible, Comprehensive, and Coordinated Services encourage patients to utilize the clinic as a first line source of care.

Patients utilize medical and support services needed due to SDH.

Figure 2. Conceptual Model of Medical Home Domains in a RWP Clinic.

the healthcare system with the First Contact Access domain and ends at the provision of longitudinal care with the Ongoing Care domain. Successful implementation of medical

home domains that occur further along in the model are dependent upon previous domains in the model. Because healthcare is delivered over time, the model is cyclical, and the last domain, Ongoing Care, feeds into the first domain, First Contact Access. For this reason each domain is dependent on all other domains. This is not a strict linear model, and the position of domains in the model is solely for the purpose of highlighting relationships and interdependencies. Furthermore, this conceptual model is not a care continuum: In reality, patients may be engaged in all domains at once. Below, I describe each domain's role in the conceptual model and highlight major findings from this case study. Posterior scores are reported here as highlights of findings from this study; however, the conceptual model is based on insights from the qualitative data and not the posterior scores.

First Contact Access domain. The First Contact Access domain refers to how quickly patients can be seen by a healthcare provider during weekdays and on evenings and weekends. The First Contact Access domain had the second lowest and lowest posterior domain mean scores for the patient and staff groups respectively. Overall, the First Contact Access domain posteriors for patient and staff groups were very similar and between the PCAT's Likert rating of "probably not" and "probably."

First Contact Access is the first domain in the model and the patient entry point into the medical home. Several staff interviewees explained that because of poor SDH around access to healthcare, many patients had limited experience with healthcare systems prior to becoming patients at the clinic. Patients who qualify for the RWP do so based on a very low income criteria, and an HIV diagnosis was often the impetus for patients to enter a healthcare setting for non-emergency care. For this case study, the First

Contact Access domain had the lowest posterior mean scores of any medical home domain; data revealed that while some patients had a provider's cell phone number, there was not an after-hours advice line nor were there evening or weekend appointments available. First Contact Access is the first domain in the model and all other domains are dependent on this domain; therefore, the clinic should consider providing after-hours advice and care to better support overall implementation of the medical home model.

Comprehensive Services Available domain. The Comprehensive Services Available domain refers to the availability of services for a variety of preventative, acute, and chronic conditions. This domain had the first highest and fourth highest posterior domain mean scores for patient and staff groups respectively. The Comprehensive Services Available domain posteriors for patient and staff groups were closest to the Likert rating of "probably."

The Comprehensive Services Available domain becomes relevant in the model once patients have successfully accessed primary and HIV care at the clinic, which is captured by the First Contact Access domain. Once PLWH became patients at the clinic, their need for clinical specialty and support services, which often addressed poor SDH, that were also available at the clinic, was evaluated. Patients and staff described an exhaustive range of services available at the clinic during interviews, and posterior mean scores for this domain indicated comprehensive services were available. Many specialty medical services were available at the clinic on a weekly basis and were provided through a partnership with the parent hospital. Clinical specialty services often addressed common HIV comorbidities, such as Hepatitis C and dermatological manifestations of HIV (Louiel, St. Laurent, Forssen, Mundy, & Pimental, 2012; Schawrtz, R., 2015).

Available support services that addressed SDH included housing coordination, mental health services, food pantry, transportation assistance, and case management.

Coordinated Services domain. Coordination of services is the provision of referrals for specialty services, assistance making specialist appointments, and communication about specialist appointments. This domain had the fourth and fifth lowest posterior domain mean scores for patient and staff groups respectively. Overall, the Coordination of Services domain posteriors for patient and staff groups were very similar and closest to the Likert rating of "probably."

Service coordination is dependent on the availability of comprehensive services. Available services need to be coordinated in order for patients to successfully navigate the healthcare system. During interviews, staff indicated that many patients needed an array of specialty and support services because they did not have access to regular health-care prior to becoming patients at the clinic because of poor SDH around income and healthcare access. Service coordination was often necessary to link patients to services that addressed poor SDH so patients could begin to focus on health issues. For example, patients were linked to substance abuse, mental health, housing, and food pantry services. Staff echoed one another and emphasized that until these needs were addressed there was little point in prescribing ARVs because medication adherence is dependent on a host of other circumstances. Posterior mean scores for this domain were indicative of care coordination and both patients and staff outlined several ways care was coordinated at the clinic.

Coordinated Information Systems domain. The Coordinated Information Systems domain is a component of the Coordinated Services domain. For patients, the

PCAT measures access to medical records. For staff, the PCAT not only measures patient access to medical records but also the use of problem lists, lab test result flow charts, and medication lists in the medical record. The difference in information captured for the two groups explains the large gap in posterior domain scores for the patient and staff group. This domain had the lowest and second highest posterior domain mean scores for patient and staff groups respectively. Despite the differences in scores, the Coordination of Services domain posteriors for patient and staff groups were both closest to the Likert rating of "probably."

For the conceptual model, this point focuses on provider utilization of the electronic medical record system to coordinate care. Staff posterior mean scores for this domain supported information systems coordination and interviews revealed that staff updated the electronic medical record for every patient encounter and entered medication and problem lists scrupulously so other providers had accurate information when working with a patient. The electronic medical record was also linked to the parent hospital and alerted PCPs when a patient was admitted to the emergency department. In summary, the electronic medical record was used by staff to coordinate care across clinic providers and within the larger hospital system.

First Contact Utilization domain. First contact utilization refers to the patient's consistent use of a provider for primary care, preventative care, and for acute health issues. First Contact Utilization pertains to patient use of the clinic for healthcare services and is only included in the patient version of the PCAT. This domain had the highest posterior mean score out of all patient domains and was closest to the Likert rating of "definitely."

In the conceptual model, the First Contact Access, Comprehensive Services Available, and Coordinated Services domains all encourage patient utilization of services at the clinic. When these domains are in place it is easier for patients to use the clinic as a first line source of care because the services they need are available and providers assist in coordinating those services. Patient interview data described consistent use of clinic services for healthcare needs and patients overwhelmingly sought care at the clinic before going elsewhere. Posterior mean scores confirmed utilization of the clinic as a first line source of care. I believe this is in part due to what staff described as the high quality services provided by an established clinic familiar with the needs of PLWH in the area.

Comprehensive Services Provided domain. The Comprehensive Services Provided domain refers to services delivered to patients in actual practice. This domain had the third highest posterior mean scores for both patient and staff groups. The Comprehensive Services Provided domain posteriors for patient and staff groups were both closest to the Likert rating of "probably."

In the conceptual model, the Comprehensive Services Provided domain is dependent on the First Contact Utilization domain because patients must use services at the clinic and keep scheduled appointments in order for comprehensive services to be provided. This domain is supported by all other domains appearing earlier in the conceptual model and especially by the First Contact Utilization and First Contact Access domains because appointments are more likely to be kept by patients if they are accessible when the patient needs them. Patients and staff described an exhaustive range of services that were provided and posterior mean scores for this domain indicated the clinic provided comprehensive services.

Ongoing Care domain. Ongoing care refers to the consistent provision of patient care by the same providers and how well providers know patients. This domain had the second highest and highest posterior domain mean scores for patient and staff groups respectively. Overall, the Ongoing Care domain posteriors for patient and staff groups were closest to the Likert rating of "probably."

The Ongoing Care domain is the last domain in the cyclical medical home conceptual model which then feeds back into the First Contact Access domain because longitudinal care creates a repeated need for accessible services. Each domain in the model is dependent on all previous domains; therefore, successful Ongoing Care is dependent on implementation of all other domains. During interviews, staff and patients characterized care consistent with the Ongoing Care domain that was long-term and personal. Staff revealed that they established a rapport with patients by asking open-ended questions about the patient's life and circumstances. Patient-provider continuity was further supported by assigning patients to a specific provider that they saw consistently. Staff indicated that they had some patients a very long time. Several patients illustrated extremely close relationships with his or her provider during interviews. This relationship facilitated a dialogue where patients shared sensitive information with providers who could then use the information to coordinate appropriate support services including those that address poor SDH. Posterior mean scores suggested that overall the clinic provided care characteristic of ongoing and continuous care.

I believe long-term and close patient provider relationships are especially important in a medical home where so many patients are affected by poor SDH. These relationships foster open communication and create a space for patients to share

information that his or her provider can use to identify and coordinate services that address SDH. There is an arrow in the model to illustrate how the Ongoing Care domain, specifically patient-provider relationships, is directly supportive of the Coordinated Care domain.

Study Limitations

Time and resources were a limitation of this study. Because the PCAT survey was read out loud to all patient survey participants, to account for different reading levels, this took more time to administer than a paper or web-based survey. Therefore, I was only able to collect a limited number of patient surveys from a large patient population. Time was also an issue as it related to staff participants because staff had so little time to participate and as a result I conducted fewer interviews and surveys with staff than initially planned.

The use of study volunteers is another limitation of this study, particularly for the staff participants. While patient participants were randomly sampled from exam rooms by physicians on a rotating basis, it was not possible to recruit staff according to a random sample. Instead, I recruited staff representing various roles using purposive snowball sampling. It was difficult to recruit staff because of busy work schedules and meetings. While it is not possible to know for certain, staff who did participate may have done so because of especially strong views of healthcare service delivery at the clinic.

While this study was not intended to be generalizable, the inclusion of one case is nonetheless a limitation. The clinic examined in this study was selected because it was found to have qualities similar to other large RWP funded clinics in metropolitan areas (Beane et al., 2013). Therefore, descriptions of medical home care at this clinic may be

comparable to other large clinics; however, the results are likely not comparable to RWP clinics with fewer resources, such as those in rural areas.

Summary

This dissertation developed and implemented the BCSM to describe how and the extent to which a southeastern RWP funded HIV clinic provided medical home care. The BCSM combines a case study framework with Bayesian statistics for a research approach conducive to mixed method, descriptive case studies with small sample sizes. Roberts (2002) and Voils (2009) and colleagues used mixed method Bayesian approaches and this dissertation contributes to this work through the development of the BCSM. For this study, eight clinic staff and 10 patients participated in interviews. Sixteen staff and 20 patients completed surveys. I used Bayes' Theorem to combine interview data, by use of subjective priors, with survey data to produce Bayesian posteriors that described medical home characteristics and associated domains: accessible, coordinated, comprehensive, and ongoing care. In this study, I found the BCSM to be a useful approach for describing complex systems and formally integrating qualitative and quantitative case study data. Specifically, posterior mean scores succinctly summarized qualitative and quantitative data. By focusing on domains with low posterior mean scores, decision makers can attend to medical home characteristics in need of improvement at the clinic. Furthermore, qualitative summaries highlight the specific processes in need of improvement and describe best practices in HIV care for domains with high posterior mean scores.

Overall findings from this study indicated that care consistent with the medical home model was provided for most domains. Mean posterior scores ranged from 2.68 to 3.55 for patients and from 2.56 to 3.31 for staff. On a four point Likert scale, scores from

3 to 4 align with medical home care and the ratings of *probably* and *definitely*. Posterior mean domain scores ($M \geq 3.0$) for both patient and staff groups reflected coordinated, comprehensive, and ongoing care. Qualitative data described how specialty medical and support services were provided and coordinated by clinicians, case managers, and support staff. Many specialty support services were provided onsite through a partnership with the affiliated hospital. Furthermore, most patient participants utilized the clinic for all health care needs on a longitudinal basis and had received care at the clinic from 1 to 15 years. However, patient and staff posterior mean scores for the accessible care domain were lower ($M < 3.0$) than the aforementioned domains as was the patient posterior mean score ($M = 2.68$) for coordination of information systems. Qualitative data revealed that while patients were able to schedule same day appointments for acute issues Monday to Friday there was not an after-hours advice line or evening/weekend appointments. Therefore, accessible care was not a generalized issue but rather an issue outside of regular clinic hours. Regarding coordinated information systems, qualitative data explained how the online patient portal was not utilized by patients because many did not have computers or internet access at home.

An unexpected finding was that the qualitative data explained relationships between medical home domains and highlighted the role of SDH and patient provider relationships. Due to interdependencies between medical home domains the system of medical home care was reliant on all domains functioning. Most importantly, this dissertation highlighted the role of SDH and patient provider relationships. The provision of services that address social determinants of health, such as access to housing, food, and transportation, was at the core of successful medical home care delivery. Once

patients' immediate needs were met, patients were better able to focus on being healthy. Furthermore, the provision of services that address SDH required that providers know patients on a personal level to understand when and what support services are needed and to appropriately coordinate those services.

Implications for Future Research

This study developed and implemented the BCSM, a step-by-step systematic approach to mixed-methods case study research. While this study demonstrated the utility of the approach for combining and succinctly describing qualitative and quantitative data, the BCSM needs to be further tested in other areas of healthcare delivery research and across different disciplines to assess its utility and benefit. The 15 BCSM steps presented in Figure 1 should serve as a guide to future researchers conducting mixed-method case studies where it is meaningful to include expert or stakeholder belief.

The flexible nature of the BCSM allows for estimating priors based on any type of qualitative data where constructs underlying the prior from qualitative data and quantitative data from a survey, or other process, can be aligned. Future uses of the BCSM can expand upon this study by using priors based on other types of qualitative data, such as observations or documents. This type of qualitative data may result in a very different process for assigning prior estimates. Alternatively, the BCSM can be applied to studies utilizing quantitative data other than survey results. For example, data on services provided to patients could be extracted from electronic medical records for inclusion in future applications of the BCSM. The BCSM should also be tested using data that represent a variety of distributional families to assess its utility with non-normal data.

Future research using the BCSM should also to take advantage of one of the major strengths of Bayesian approaches. Specifically, a Bayesian posterior can become the prior when new data are collected. Longitudinal BCSM studies should employ Bayesian updating to see how posterior estimates change over time as new data are included.

Future research on HIV medical homes should focus on both detailed descriptions of health care service delivery and also on patient outcomes in HIV medical homes. Detailed descriptions of how HIV medical homes operate are important because as Pappas and colleagues (2014) explained, "Serving PLWH through a patient-centered medical home (PCMH) may be a successful strategy for increasing the number of people who remain in care and achieve viral control" (e49). For this reason, additional detailed descriptions of RWP clinic processes for delivering medical home care are important for clinicians, healthcare administrators, and policy makers focused on providing enhanced HIV care. Research should also examine differences in the provision of medical home care at RWP clinics in metropolitan areas compared to rural areas with fewer resources. Studies that describe care provided in HIV medical homes are especially useful for community health centers and private practice as these settings care for more PLWH that gain insurance coverage through the ACA. In summary, descriptions of RWP medical home care processes contribute to knowledge of best practices in HIV care.

Studies on the HIV medical homes should also focus on patient health outcomes to assess the impact of HIV medical home care. This is important because as Weiser (2015) and colleagues found, low income patients were more likely to achieve viral suppression in RWP funded clinics, where more support services where provided, than in

non-RWP clinics. Due to the public health implications of viral suppression for PLWH, namely improved health outcomes for the patient and decreased risk of transmission, it is necessary to know how HIV medical homes provide care and to confirm that outcomes in these settings confirm Weiser (2015) and colleagues' findings.

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APPENDIXES

Appendix A

Staff Interview Questions

1. In what department or sub-clinic do you work at the clinic?

2. Can you describe your role within your department at the clinic?

    Probe:

    a. What is your primary profession and responsibilities as they relate to

        patient care and/or coordination of services?

3. Can you describe what a typical work day is like for you?

    Probe:

    a. For example are there specific tasks that you have in the morning, early

        afternoon, or late afternoon?

    b. Are there processes that you repeat throughout the day?

    Probe if interviewee directly provides services to patients:

    c. Do you see patients every day of the week? If yes.

        i. Can you describe a typical work day when you see patients?

        ii. Can you describe a typical work day when you do not see patients?

4. Are any of your job responsibilities more challenging than others and why?

5. Can you describe your department or sub-clinic's role within the clinic?

    Probe:

    a. How do the services that you and others in your department provide fit

        into the patient care process with other departments?

6. Do you or your department work with staff/providers from other departments regularly and if so what providers/departments?

    Probe:

    a. Why and when does your department work with those providers/departments?

    b. How and how often do you or your department usually communicate with those providers/departments (email, face-to-face meetings)?

7. Can you describe how patients are referred to the clinic?

8. Can you describe the process for determining which patients are able to receive services at the clinic?

9. Can you describe how the care process begins when a patient is admitted to the clinic? For example, who or which department does a patient visit first, second, and third and why?

    Probe:

    a. How is service specific eligibility or screening determined?

    b. What is the order of service types provided for new patients and why?

    c. What is timeline for providing services to new patients and why?

    d. Is the process the same for all patients? Why or why not?

10. At what point during entry into care does a new patient receive services from your department?

    Probe:

    a. Do all or only certain patients receive services from your department initially and why?

11. About how often will patients receive services from your department after the initial visit and why?

    Probe:

    a. Do all or only certain patients receive services from your department after the initial visit and why?

    b. What influences when these appointments occur?

12. Who does a patient see when they receive services from your department after the initial visit?

    Probe:

    a. Do patients see the same provider or any available provider for those appointments and does this vary?

13. Can you describe what happens when a patient has an acute or immediate need for services provided by your department?

    Probe:

    a. When is a patient usually able to get an appointment for an acute or immediate need for services provided by your department?

    b. What days/times are services available to patients with an acute or immediate need for services provided by your department?

    c. Are patients able to speak with anyone on the phone after your department's regular hours? If so, who do they contact and how?

14. What happens when a patient comes to you for a need for which you or your department cannot directly provide services?

    Probe:

a. Is there any way for you or your department to know what happened regarding that patient's need and how? For example, would you know if they received a needed service and the outcome?

15. What happens if a patient needs documentation of services your department provided or needs access to his or her medical record?

Probe:

a. Who would the patient contact and how would they get his/her records? For example, would a patient pick up records, access them online, or are they mailed?

b. About how long would it take for a patient to get his or her records?

16. How would you describe the clinic to a patient considering getting care here?

17. How do you describe the patients at the clinic that you work with the most?

Probe:

a. Demographic characteristics

b. Socioeconomic characteristics

c. Health characteristics

18. What do you see as your patient's greatest needs?

Probe:

a. Are there patient needs for which your department is especially good at providing related services?

b. Are there patient needs for which services are not available at the clinic?

19. What is your primary profession?

○ Dentist

○ Other Dental Professional

○ Advanced Practice Nurse

○ Nurse

○ Physician

○ Physician Assistant

○ Mental/Behavioral Health Professional

○ Case Manager

○ Social Worker

○ Substance Abuse Professional

○ Other (please specify)

20. Are you of Hispanic, Latino/a, or Spanish origin?

○ Yes

○ No

21. What is your racial background (Select all that apply)?

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian/Other Pacific Islander

☐ White

22. What is your age?

○ 18 to 24

○ 25 to 34

○ 35 to 44

○ 45 to 54

○ 55 to 64

○ 65 to 74

○ 75 or older

22. What is your gender?

○ Female

○ Male

○ Transgender

Appendix B

Patient Interview Questions

Note: Refer to the Clinic specifically because patients may receive some services

elsewhere.

1. Did you go somewhere else for medical care before you started coming to the

   Clinic? If so, would you like to tell me about where you went?

2. When did you start coming to Clinic?

3. What did you know about the Clinic before you starting coming here?

4. Can you tell me about when you first starting coming to the Clinic?

   Probe:

   a. Were you referred to the clinic? If so, who referred you?

   b. What was it like for you when you first came to the clinic?

   c. Who did you see first when you started coming to the clinic? After that

      which provider or department did you visit?

5. Do you come to Clinic regularly?

   a. If yes, about how often?

6. Can you describe some of the care or services you get at the Clinic?

   Probe:

   a. Service types

      i. Medical services

      ii. Counseling or mental health services

      iii. Prescriptions

      iv. Dentistry

      v. Food pantry

      vi.   Women (gynecology)

     vii.   Case management

7. Do you usually see the same person for that service or a different person each time? (Ask individually about each service patient mentions above)

8. How do you make an appointment for that service? (Ask individually about each service patient mentions above)

    Probe:

    a. Does the Clinic usually have appointments for that service when you need one and when it is convenient for you to come to the clinic?

    b. How many days or weeks do you usually have to wait for that appointment?

9. What is a typical visit to the Clinic like for you?

    Probe:

    a. When you come to the Clinic do you come for one service at a time or for multiple services? If you receive multiple services in a day how does that work?

    b. On a typical visit, how long are you usually at the Clinic? Does the length of time you are at the clinic vary from visit to visit and if so why?

10. Can you call someone at the Clinic if you have questions during the evening or weekends? If so, have you done this in the past and was the person helpful?

11. Does anyone at the Clinic talk to you about taking your medications? If so, can you tell me about that person and how often you see them?

12. Does anyone at the Clinic talk to you about needs that you have other than medical care? If so, can you tell me about that person?

13. Does your doctor at the Clinic know about where and who you live with? If yes, how do they know?

14. Do you ask your doctor at the Clinic questions about your care? If yes, what types of questions do you ask most often? Are your doctor's answers helpful?

15. How do you normally get to the Clinic?

> Probe:

> a. Do you ever have problems getting to the Clinic?

> b. If you take public transportation do you receive MARTA tokens from the Clinic?

16. Do you pay for any services at the Clinic? If yes, which services?

17. Do you have an insurance card you use when you come to the Clinic? If so, what type of insurance do you have and how does it work?

> Probe:

> a. Does your insurance pay for all the services you need? If not, what types of services do you need that your insurance does not cover?

> b. Do you have copays or an amount you pay when you get care or prescriptions and use your insurance card?

18. Are there any services that you need and cannot get at the Clinic? If so what are those services?

19. Would you tell a friend or family with HIV to come to the Clinic? Why or why not? What would you tell them about the Clinic?

20. Is there anywhere else you go for medical care? If so, would you like to tell me about where you go?

21. Is there anywhere else you go for help or for services other than medical care? If so, would you like to tell me about where you go?

22. Are you of Hispanic, Latino/a, or Spanish origin?

○ Yes

○ No

23. What is your racial background (Select all that apply)?

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian/Other Pacific Islander

☐ White

24. What is your age?

○ 18 to 24

○ 25 to 34

○ 35 to 44

○ 45 to 54

○ 55 to 64

○ 65 to 74

○ 75 or older

22. What is your gender?

○ Female

○ Male

○ Transgender

Appendix C

Staff PCAT Survey

Georgia State University: College of Education: Department of Education Policy Studies Informed Consent

Title: Describing Health Care Service Delivery in a Ryan White Program Funded HIV Clinic: A Bayesian Mixed-Method Case Study

Principal Investigator: William Curlette, PhD

Student Principal Investigator: Stephanie Beane, MEd

I. Purpose: You are invited to participate in a research study. The purpose of the study is to describe how health care services are delivered at a Ryan White funded HIV clinic. You will be asked to complete a web-based survey about services that are available to patients and how services are delivered at the Ponce De Leon Clinic. You will not be surveyed about specific patients. You are invited to participate because you are a nurse, advanced practice nurse, physician assistant, physician, dental professional, nutritionist, case manager, adherence nurse, or mental health or substance abuse counselor at the Grady Ponce De Leon Clinic. You must be 18 years of age or older and employed at the Ponce De Leon Clinic for at least one year to participate. A total of 35 staff participants will be recruited for this study. Participation will require 15 to 20 minutes of your time.

II. Procedures: If you decide to take part, you will complete a web-based survey about health care service delivery processes at the Grady Ponce De Leon Clinic. The survey will take approximately 15 to 20 minutes to complete. You will receive $10 for your participation upon completing the survey.

III. Risks: In this study, you will not have any more risks than you would in a normal day of life. Your name will not be captured on your survey. Your individual responses will not be shared with anyone outside the study. You will be assigned an anonymous numeric ID for the study that will not be kept with your name, email address, or other identifying information.

IV. Benefits: Participation in this study may not benefit you personally. You may benefit from the opportunity to share information about processes in your workplace. Overall, we hope to gain information about how health care services are delivered at a Ryan White funded HIV clinic.

V. Voluntary Participation and Withdrawal: Participation in this research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may stop participating at any time. Whatever you decide, your participation or withdrawal will not affect how you are treated in the workplace.

VI. Confidentiality: We will keep your records private to the extent allowed by law. Dr. William Curlette of Georgia State University, the Principal Investigator, and Stephanie Beane, the second Principle Investigator, will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection OHRP). We will use an anonymous numeric ID rather than your name on the survey. Your anonymous ID will not be kept with your name or other identifying information. Your survey responses will not be shared with anyone outside the study and your computer's IP address will not be recorded. Information sent over the internet may not be entirely secure. Survey data files will be stored on a password- and firewall-protected computer at the researcher's place of work and on a password protected survey website. Your name and other facts that may identify you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VII. Contact Persons: Contact Dr. William Curlette at 404-413-8289 or wcurlette@gsu.edu or Stephanie Beane at 678-481-9343 or sbeane@emory.edu if you have questions, concerns, or complaints about this study. You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Grady Health System Disclaimer We will give you emergency care if you are injured by this research. However, Grady Health System has not aside funds to pay for this care or to compensate you if a mishap occurs. If you believe you have been injured by this research, you should contact Dr. Armstrong at (404) 616-2440.

IX. Patient Rights If you are a patient receiving care from the Grady Health System and you have a question about your rights, you may contact Dr. Curtis Lewis, Senior Vice President for Medical Affairs at (404) 616-4261.

X. Copy of Consent Form to Subject: You may print this consent form for your records or request a copy of this consent form to be emailed to you. By completing this online survey you consent to participate in this study. If you agree to participate in this study please click on the button below that reads "next" to proceed to the survey.

1. Of patients you care for at the Ponce Center, what is the approximate percent with the following types of insurance plans? (If none, place a 0; If don't know, leave all fields blank).

Private insurance

Medicaid

Direct payment from uninsured patients

Ryan White Program

Un-reimbursed (charity care)

Other

* 2. Please check the one best answer.

	0-20%	21-40%	41-60%	61-80%	81-100%	Not sure/don't know
What percent of your patients at the Ponce Center have health coverage that limits referrals, limits to whom you can refer, or requires approval for referrals?	○	○	○	○	○	○
About what percent of your patients at the Ponce Center have health coverage that requires pre-approval for non-emergency hospitalizations?	○	○	○	○	○	○
About what percent of your patients at the Ponce Center must pay a fee or copayment at each visit?	○	○	○	○	○	○
What percent of your patients at the Ponce Center have long-term medical or behavioral problems or disabilities?	○	○	○	○	○	○

* 3. On average, about how long do patients stay with you at the Ponce Center?

- ○ Less than 6 months
- ○ 6 months to 1 year
- ○ 1 – 2 years
- ○ 3 – 4 years
- ○ 5 or more years
- ○ Too variable to specify
- ○ Don't know

* 4. Please check the one best answer.

	0-20%	21-40%	41-60%	61-80%	81-100%	Not sure/don't know
What percent of your patients at the Ponce Center are "enrolled," or are assigned to receive all their non-referred care at your practice?	○	○	○	○	○	○
About what percent of your patients at the Ponce Center are on a list or computerized roster that identifies them as your patients?	○	○	○	○	○	○
What percent of your patients at the Ponce Center do you think use the Ponce Center for all their well and sick health care needs (with the exception of true emergencies and referred care)?	○	○	○	○	○	○

* 5. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
When the Ponce Center is open and patients get sick, would someone from your office see them that day?	○	○	○	○	○
When the Ponce Center is open, can patients get advice quickly over the phone when they think they need it?	○	○	○	○	○
When the Ponce Center is closed, do you have a phone number patients can call when they get sick?	○	○	○	○	○
When the Ponce Center is closed during the night and patients get sick, would someone from your office be able to see them that night?	○	○	○	○	○

* 6. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
At the Ponce Center, do patients see the same clinician each time they make a visit?	○	○	○	○	○
If patients have a question, can they call and talk to the doctor or nurse who knows them best?	○	○	○	○	○
Do you think you know your patients at the Ponce Center "very well"?	○	○	○	○	○
Do you think you understand what problems are most important to the patients you see	○	○	○	○	○

of visit(s) with the specialist or special service?

* 7. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
When patients at the Ponce Center need a referral, does someone discuss different places the family might go to get help with their problem?	○	○	○	○	○
Does someone at the Ponce Center help the patient make the appointment for the referral visit?	○	○	○	○	○
When patients are referred, does a provider give them any written information to take to the specialist?	○	○	○	○	○
	○	○	○	○	○

After the visit, does a provider talk with patients about the results
* 8. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Are patients at the Ponce Center expected to bring their medical records, such as immunizations or medical care they received in the past?	○	○	○	○	○
Are patients allowed to look at their medical records if they wanted to?	○	○	○	○	○
Are patient records available when you see patients?	○	○	○	○	○

* 9. Does the Ponce Center use the following methods to assure that indicated services are provided? (Please check the one best answer).

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Flow sheets in patients' charts for lab results	○	○	○	○	○
Problem lists in patients' records	○	○	○	○	○
Medication lists in patients' records	○	○	○	○	○
Suturing for a minor laceration					

* 10. If patients need any of the following services, would they be able to get them on-site at the Ponce Center? (Please check the one best answer).

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Immunizations	○	○	○	○	○
Family planning or birth control services	○	○	○	○	○
Counseling for behavior or mental health problems	○	○	○	○	○
	○	○	○	○	○

* 11. Are the following subjects discussed with patients at the Ponce Center? (Please check the one best answer).

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Nutritional/non-nutritional foods or getting enough sleep	○	○	○	○	○
Home safety, like using smoke detectors and storing medicines safely	○	○	○	○	○

* 12. Are the following subjects discussed with patients at the Ponce Center? (Please check the one best answer).

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Handling family conflicts	○	○	○	○	○
Advice about appropriate exercise	○	○	○	○	○
Medications being taken	○	○	○	○	○

* 13. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Do providers at the Ponce Center ask patients about their ideas and opinions when planning treatment and care for the patient or family member?	○	○	○	○	○
Do providers at the Ponce Center ask about illnesses or problems that might run in the patients' families?	○	○	○	○	○
Are providers at the Ponce Center willing and able to meet with family members to discuss a health or family problem?	○	○	○	○	○

* 14. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Does the Ponce Center make home visits?	○	○	○	○	○
Do you think providers at the Ponce Center have adequate knowledge about the health problems of the communities you serve?	○	○	○	○	○
Do providers at the Ponce Center get opinions and ideas from people that might help to provide better health care?	○	○	○	○	○

* 15. Does the Ponce Center use the following methods to monitor and/or evaluate the effectiveness of services/programs?

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Feedback from community organizations or community advisory boards	○	○	○	○	○
Systematic evaluations of your programs and services	○	○	○	○	○
Have a consumer on the board of directors or advisory committee	○	○	○	○	○

* 16. Does the Ponce Center use any of the following activities to reach out to populations in the communities you serve?

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Networking with state and local agencies involved with culturally diverse groups	○	○	○	○	○
Involvement with neighborhood groups/community leaders	○	○	○	○	○

* 17. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Can the Ponce Center communicate with people who do not speak English well?	○	○	○	○	○
If needed, do providers at the Ponce Center take into account a family's special beliefs about health care or use of folk medicine, such as herbs/homemade medicines?	○	○	○	○	○
If needed, do providers at the Ponce Center take into account a family's request to use alternative treatment, such as homeopathy or acupuncture?	○	○	○	○	○

Appendix D

Patient PCAT Survey

Georgia State University
College of Education: Department of Educational Policy Studies
Informed Consent

Title:
Describing Health Care Service Delivery in a Ryan White Program Funded HIV Clinic: A Bayesian Mixed-Method Case Study

Principal Investigator: William Curlette, PhD
Student Principal Investigator: Stephanie Beane, MEd

I. Purpose:
You are invited to take part in a research study. This study seeks to learn how patients get health care services at the Grady Ponce De Leon Clinic. You will be asked to take part in a survey about how you get health care services at the Grady Ponce de Leon Clinic. You will not be asked specific questions about your health. You are invited to take part because you are a patient at The Grady Ponce De Leon Clinic. You must be 18 years of age or older and a patient at the Ponce De Leon Clinic for at least one year to take part. Thirty-five patients will be asked to take part in this study. Taking part in this study will take 30 minutes.

II. Procedures:
If you decide to take part in the survey, the student principle investigator will read questions out loud and your verbal responses will be recorded. The survey will take place in a conference room at the Ponce de Leon Clinic after your medical appointment. The survey will take place during one session that lasts no more than 30 minutes. You will receive $10 for taking part in a survey.

III. Risks:
In this study, you will not have any more risks than you would in an average day of life. Your name will not be recorded on the survey. Your individual responses will not be shared with anyone outside the study. You will be assigned a numeric ID for the study that does not identify you. The ID will not be kept with your name or other identifying information.

IV. Benefits:
Participation in this study may not benefit you but the results will help others learn how HIV care is provided.

V. Voluntary Participation and Withdrawal:
It is your choice if you want to be in this study. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop the interview at any time. Whatever you decide, your participation or withdrawal will not affect how you are treated at the Ponce de Leon Clinic.

VI. Confidentiality:

We will keep your information private as much as the law allows. Dr. William Curlette of Georgia State University, the Principal Investigator, and Stephanie Beane, the second Principle Investigator, will have access to the information you provide. Information may be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection OHRP). We will use an anonymous numeric ID and not your name on study records, audio recordings, and interview transcripts. Your anonymous ID will not be kept with your name or other identifying information. Your interview responses will not be shared with anyone outside the study. Your audio recorded interview will be stored on a password- and firewall-protected computer at the researcher's place of work. Your name and other facts that may identify you will not appear when we present this study or publish its results. The findings will be reported in group form. You will not be identified personally. Interview audio recordings will be deleted two years after the study is over.

VII. Contact Persons

Contact Dr. William Curlette at 404-413-8289 or wcurlette@gsu.edu or Stephanie Beane at 678-481-9343 or sbeane@emory.edu if you have questions or want to talk about this study. You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, obtain information, or make suggestions about the study. You can also call Susan Vogtner if you have questions about your rights in this study.

VIII. Grady Health System Disclaimer

We will give you emergency care if you are injured by this research. However, Grady Health System has not aside funds to pay for this care or to compensate you if a mishap occurs. If you believe you have been injured by this research, you should contact Dr. Armstrong at (404) 616-2440.

IX. Patient Rights

If you are a patient receiving care from the Grady Health System and you have a question about your rights, you may contact Dr. Curtis Lewis, Senior Vice President for Medical Affairs at (404) 616-4261.

X. Copy of Consent Form to Subject:

You will receive a copy of this consent form to keep.
Please verbally indicate if you are willing to volunteer for this study.

Do you want to participate in this survey and do you have any questions before we begin?

I will read each question out loud and give you time to answer. Most questions have the same answer options of "definitely", "probably", "probably not", or "definitely not." You can also say that you are "not sure or don't know" I will read the answer options out loud each time and you can ask me to repeat any questions. Are you ready to begin?

1. Is there a doctor or place that you usually go if you are sick or need advice about your health?

- ⭘ No
- ⭘ Yes (Please give name of place)

2. Is there a doctor or place that knows you best as a   person?

- ⭘ No
- ⭘ Yes, same place as above
- ⭘ Yes, different place (Please give name of place)

3. Is there a doctor or place that is most responsible for your health   care?

○ No

○ Yes, same as the #1 and #2 above

○ Yes, same as #1 only

○ Yes, same as #2 only

○ Yes, different from #1 and #2 above (Please give name of place)

* 4. How long have you been coming to the Ponce De Leon Clinic for medical care?

○ Less than 6 months

○ 6 months to 1 year

○ 1 – 2 years

○ 3 – 4 years

○ 5 or more years

○ Too variable to specify

○ Not sure/Don't know

5. How many times have you been to the Ponce De Leon   Clinic?

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┌─────────────────────────────────────┐
│                                      │
└─────────────────────────────────────┘
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* 6. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
When you need a regular general checkup, do you go to the Ponce De Leon Center before going somewhere else?	○	○	○	○	○
When you have a new health problem, do you go to the Ponce De Leon Center before going somewhere else?	○	○	○	○	○
When you have to see a specialist, does your doctor at the Ponce De Leon Center have to approve or give you a referral?	○	○	○	○	○

* 7. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
When the Ponce De Leon Center is open and you get sick, would someone from there see you the same day?	○	○	○	○	○
When the Ponce De Leon Center is open, can you get advice quickly over the phone if you need it?	○	○	○	○	○
When the Ponce De Leon Center is closed, is there a phone number you can call when you get sick?	○	○	○	○	○
When the Ponce De Leon Center is closed and you get sick during the night, would someone from there see you that night?	○	○	○	○	○

* 8. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
When you go to the Ponce De Leon Center, are you taken care of by the same doctor or nurse each time?	○	○	○	○	○
If you have a question, can you call and talk to the doctor or nurse who knows you best at the Ponce De Leon Center?	○	○	○	○	○
Does your doctor at the Ponce De Leon Center know you very well as a person, rather than as someone with a medical problem?	○	○	○	○	○
Does your doctor at the Ponce De Leon Center know what problems are most important to you?	○	○	○	○	○

9. Have you ever had a visit to any kind of specialist or special service?

○ Yes
○ No

* 10. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Did your doctor at the Ponce De Leon Center discuss with you different places you could have gone to get help with that problem?	○	○	○	○	○
Did your doctor or someone working with your doctor at the Ponce De Leon Center help you make the appointment for that visit?	○	○	○	○	○
Did your doctor at the Ponce De Leon Center write down any information for the specialist about the reason for the visit?	○	○	○	○	○
After you went to the specialist or special service, did your doctor at the Ponce De Leon Center talk with you about what happened at the visit?	○	○	○	○	○

* 11. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
When you go to the Ponce De Leon Center, do you bring any of your own medical records, such as shot records or reports of medical care you had in the past?	○	○	○	○	○
Could you look at your medical record if you wanted to?	○	○	○	○	○
When you go to the Ponce De Leon Center, is your medical record always available?	○	○	○	○	○

* 12. Following is a list of services that you or your family might need at some time. For each one, please indicate whether it is available at the Ponce De Leon Center.
Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Immunizations (shots)	○	○	○	○	○
Family planning or birth control services	○	○	○	○	○
Counseling for behavior or mental health problem	○	○	○	○	○
Sewing up a cut that needs stiches	○	○	○	○	○

* 13. The next questions deal with different types of health care services that you sometimes get. Please check the one best answer.

In visits to the Ponce De Leon Center, are any of the following subjects discussed with you?

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Advice about healthy foods and unhealthy foods or getting enough sleep	○	○	○	○	○
Home safety, like getting and checking smoke detectors and storing medicines safely	○	○	○	○	○
Ways to handle family conflicts that may arise from time to time	○	○	○	○	○
Advice about appropriate exercise for you	○	○	○	○	○
Checking on and discussing the medications you are taking	○	○	○	○	○

* 14. These next questions are about the relationship of your health care providers at the Ponce De Leon Center with your family. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Does your doctor at the Ponce De Leon Center ask you about your ideas and opinions when planning treatment and care for you or a family member?	○	○	○	○	○
Has your doctor at the Ponce De Leon Center asked about illnesses or problems that might run in your family?	○	○	○	○	○
Would your doctor at the Ponce De Leon Center meet with members of your family if you thought it would be helpful?	○	○	○	○	○

* 15. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Does anyone at the Ponce De Leon Center office ever make home visits?	○	○	○	○	○
Does your doctor at the Ponce De Leon Center know about the important health problems of your neighborhood?	○	○	○	○	○
Does your doctor at the Ponce De Leon Center get opinions and ideas from people that will help to provide better health care?	○	○	○	○	○

* 16. Please check the one best answer.

	Definitely	Probably	Probably not	Definitely not	Not sure/don't know
Would you recommend your doctor at the Ponce De Leon Center to a friend or relative?	○	○	○	○	○
Would you recommend your doctor at the Ponce De Leon Center to someone who does not speak English well?	○	○	○	○	○
Would you recommend your doctor at the Ponce De Leon Center to someone who uses folk medicine, such as herbs or homemade medicines, or has special beliefs about health care?	○	○	○	○	○

17. These are some questions about how you pay for your health care. Please check the one best answer. How much of the past 12 months were you covered by any type of health insurance, including Medicaid?

○ All year

○ Most months

○ Only a few months or weeks

○ Never

○ Not sure/Don't remember

18. During the last 12 months, was any of your health care paid through:

	Yes	No	Not sure/Don't remember
HMO (health maintenance organization)	○	○	○
Some other private health insurance company	○	○	○
Medicaid or Medical Assistance	○	○	○
Some governmental health department clinic	○	○	○
Personal income (cash, check, credit card)	○	○	○
Any other way (please specify)	○	○	○

19. Would you say your health is:

◯ Excellent

◯ Very good

◯ Good

◯ Fair

◯ Poor

* 20. Are you of Hispanic, Latino/a, or Spanish origin?

◯ Yes

◯ No

* 21. What is your racial background (Select all that apply)?

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian/Other Pacific Islander

☐ White

* 22. What is your age?

◯ 18 to 24

◯ 25 to 34

◯ 35 to 44

◯ 45 to 54

◯ 55 to 64

◯ 65 to 74

◯ 75 or older

23. What is your gender?

○ Female

○ Male

○ Transgender

Appendix E

Excel Spreadsheet of Prior Assignment Calculation

For Patient Ongoing Care Domain

	A	B	C	D	E	F	G
1			**Patient - Ongoing Care Domain**				
2	Patient	Q1. See same MD each visit	Q2. Talk to MD that knows best	Q3. MD knows as person	Q4. MD knows most important problems	Total Score	Summated Likert Scale Score
3	1	4	4	3	4	15	3.75
4	2	4	4	3	4	15	3.75
5	3	4	4	3	4	15	3.75
6	4	4	4	3	4	15	3.75
7	5	4	4	4	4	16	4
8	6	4	2	2	3	11	2.75
9	7	4	4	3	4	15	3.75
10	8	4	4	3	4	15	3.75
11	9	4	4	3	4	15	3.75
12	10	4	4	3	3	14	3.5
13						**Prior Mean**	3.65
14						**Prior Standard**	0.34
15							