

**Understanding the Role of the Patient-Centered Medical Home in Building a Strong
Primary Care Foundation in the U.S.**

By

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Understanding the Role of the Patient-Centered Medical Home in Building a Strong Primary
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Abstract

It is generally agreed that there is much room for improvement in the U.S. healthcare system. In international comparisons, health care in the U.S. is consistently the most expensive and the U.S. lags other western industrialized countries in broad measures of health, such as morbidity and mortality. The Triple Aim goals for the improvement of U.S. healthcare outlined by the Institute for Healthcare Improvement (IHI) in 2008 continue to be widely embraced today – to improve the experience of care, improve the health of populations and to lower the per capita cost of care. To achieve these aims, the need for an “integrator” accountable for the achievement of all three aims on behalf of a defined population was recommended. One of the primary roles of the integrator is the redesign of primary care.

Primary Care has long been regarded as a critical component of improving the healthcare system. In recent years, the Patient-Centered Medical Home (Medical Home) has been the favored model to return primary care to a more prominent and impactful role in the overall health care system. Using data from a commercial health plan Medical Home program in a regional geographic setting, this dissertation provides insights into the role and impact of the Medical Home in fulfilling the aspirational goals for U.S. primary care. This study examined basic differences between Medical Home and non-Medical Home practices, whether Medical Home implementation is associated with differences in physician practice patterns, and whether ownership of Medical Homes by hospitals or healthcare systems is associated with differences in total cost of care or the utilization of high-cost services.

This study finds that small, rural primary care practices are under-represented among Medical Homes, that physicians practicing in Medical Homes provide care that is more

consistent with high quality primary care than physicians practicing in non-Medical Homes, and that Medical Homes owned by hospitals or healthcare systems are associated with a higher total cost of care and higher rates of inpatient hospital admissions.

The focus on the Medical Home model has provided an important vehicle for the evolution of primary care over the last ten years. It is an opportune time in this ongoing evolution for policy makers, health plans and healthcare purchasers to shift the conversation from a focus on the Medical Home to how to support high quality primary care in a consistent and sustainable manner across all primary care practices, regardless of practice size, geography, or ownership. Payers, including government purchasers and commercial health plans, are uniquely positioned to support this shift in the form of the “integrator” described as necessary to the fulfillment of the Triple Aim goals.

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Chapter 1: Introduction

Background and Context for the Patient-Centered Medical Home

Improving the delivery of primary care is widely believed to be essential to the reform of the U.S. health care system (Berenson & Rich, 2010a; Bodenheimer, Wagner, & Grumbach, 2002; Caminal, Starfield, Sanchez, Casanova, & Morales, 2004; Essary et al., 2009; Martin et al., 2004, p. 7; R. L. Phillips, Jr. & Bazemore, 2010). U.S. participation in the signing of The Declaration of Alma Alta at the International Conference on Primary Health Care in 1978 (*Declaration of Alma-Ata, 1978*) created an official and unifying position on the importance of primary care to the U.S. healthcare system.

International comparisons highlight that health care spending in the U.S. outpaces other industrialized nations while outcomes, as measured in terms of mortality and morbidity, fall well short (Anderson, Petrosyan, & Hussey, 2002; Davis, Stremikis, Squires, & Schoen, June, 2014; Schneider, Sarnak, Squires, Shah, & Doty, 2017; Schoen et al., 2009; Schoen et al., 2011; Squires, 2011). More in-depth analysis of the role and significance of primary care to overall health system performance supports the notion that primary care can play a significant role in controlling U.S. health care cost and improving health outcomes (Macinko, Starfield, & Shi, 2003; Starfield, 2012; B. Starfield, L. Shi, & J. Macinko, 2005a).

The “Triple Aim” recommendations made by The Institute for Healthcare Improvement in 2008 to enhance the patient experience, improve the health of the population and reduce (or at least control) the per capita cost of care, strengthened the calls for a greater focus on primary care (Berwick, Nolan, & Whittington, 2008). In this article, these authors advocate for the role of an “integrator” – a single entity that assumes responsibility for fulfillment of all three aims for specific populations. In describing the role of the integrator, they also highlight the importance of

primary care and the need to build “the capability and infrastructure to enable primary care practices to function in this expanded role” that includes team-based care that is coordinated, continuous and easily accessible. The authors’ call for an “integrator” role also underscores the complexity of the healthcare environment in which primary care operates and the need for it to be connected to a broader system of integrated care with shared goals to fully reap its benefits.

One of the general challenges in the discussion of primary care can be the lack of broad agreement on what constitutes primary care in the U.S. The definition most often cited in primary care literature comes from the Institute of Medicine (IOM) Committee on the Future of Primary Care, which convened in 1994. In its first report, *Defining Primary Care: An Interim Report* published in 1994, primary care was defined in the following manner. (Note that terms in bold were italicized in the original publication for emphasis.)

*Primary care is the provision of **integrated, accessible health care services** by **clinicians** who are **accountable** for addressing a large **majority of personal health care needs**, developing a **sustained partnership** with **patients** and practicing in the **context of family and community**.*

The final report of this IOM committee, published in 1996, made a series of recommendations intended to elevate the role and function of primary care in the U.S. with the goals of improving health, managing cost, and ensuring equitable access for all Americans. The final report was promoted as a “road map” to improving overall health system performance and is built on five key assumptions as follows:

1. *Primary care is the logical foundation of an effective health care system because primary care can address the large majority of the health problems present in the population.*
2. *Primary care is essential to achieving the objectives that together constitute value in health care – quality of care (including achievement of desired health outcomes), patient satisfaction, and efficient use of resources.*
3. *Personal interactions that include trust and partnership between patients and clinicians are central to primary care.*

4. *Primary care is an important instrument for achieving strong emphasis on (a) health promotion and disease prevention, and (b) care of the chronically ill, especially among the elderly with multiple problems*
5. *The trend toward integrated health care systems in a managed care environment will continue and will provide both opportunities and challenges for primary care.*

While there are many approaches advanced to elevate the role of primary care, the Patient-Centered Medical Home (Medical Home) has emerged as a favored primary care model in the U.S. The term “Patient-Centered Medical Home” dates to 1967 when it was introduced by the American Academy of Pediatrics (AAP) to describe the need for a single patient record (Sia, Tonniges, Osterhus, & Taba, 2004). The Medical Home experienced a resurgence of interest in 2006 when large employers and the primary care professional societies joined forces to create the Patient-Centered Primary Care Collaborative (PCPCC) (“Patient-Centered Primary Care Collaborative,” 2017). The signing of the Joint Principles of the Patient-Centered Medical Home followed in 2007 (*Joint Principles of the Patient-Centered Medical Home*, 2007). The following bullets represent the seven joint principles (as originally presented) that were designed to give better definition and create a more meaningful and expanded role to the practice of primary care.

- Personal physician
- Physician directed medical practice
- Whole person orientation
- Care is coordinated and/or integrated
- Quality and safety
- Enhanced access
- New forms of payment

The Medical Home model seeks to change the experience of primary care from an episodic orientation with the office visit as the central focus and primary point of patient interaction to a team-based care delivery environment that is comprehensive, coordinated, continuous, easily accessed and focused on the needs of the whole person. The traditional primary care practice is built primarily around the appointment schedule and operates in a more

reactive mode to patient requests for appointments or services. The Medical Home creates a proactive framework within which practices can deliver meaningful patient care outside of the 10-15-minute office visit structure. Daily team huddles, the creation and maintenance of individualized patient care plans, outbound patient reminder calls for upcoming preventive or chronic care services, follow-up calls to ensure medications are filled and electronic (telephonic or email) appointments are examples of the ways in which the Medical Home model changes the orientation away from a focus on “Who’s on the appointment schedule today?” to “How are our patients doing and what do they need from us?”

These many changes that a primary care practice undergoes when transforming to the Medical Home model underscore the importance of the seventh Joint Principle, “new forms of payment.” The central focus on the office visit in a traditional primary care practice is a logical consequence of the predominant fee-for-service payment mechanism which requires a face-to-face service and eligible code to be reimbursable by most third-party payers. Services provided outside of the face-to-face office visit go uncompensated unless new payment models or approaches are implemented simultaneously with the transformation to the Medical Home model.

The Uniquely American Challenges of Primary Care

To better understand the challenges to transforming the role of primary care, it is helpful to understand its position within the context of the broader healthcare system that is dominated by hospitals and the practice of specialty medicine in the U.S. today. There are many factors that are relevant to understanding this context, two of which I have chosen to highlight in this paper – 1) the influence of the biomedical paradigm and third-party payment for healthcare on the

specialization of medical practice and 2) the contrast between the way primary care is positioned in the U.S. versus top-performing nations to which it is compared.

The Biomedical Paradigm, Third Party Payment, and the Specialization of American Health Care

The practice of medicine in the U.S. is planted in a tradition that is focused on the biomedical understanding of disease. This is consistent with the definitions of health as being “free from disease” and disease which is understood as originating in “organ system dysfunction” (Sandy, Bodenheimer, Pawlson, & Starfield, 2009). In 1910, the Flexner Report advocated for the creation of “centers of excellence” within teaching hospitals to focus on unique diseases or body functions. The result was the creation of a variety of medical specialties in training and in practice that had not previously existed (Stevens, 1971). Until this time, all physicians were considered “general practice” upon completion of medical school and there was no opportunity to be formally recognized within an area of specialty medicine, such as cardiology or oncology.

Another phenomenon that favored the growth of non-primary care medical specialties occurred during the post-World War II era. As physicians returned home from the war, the GI Bill presented an opportunity to advance their careers by continuing medical school education at no cost. At that time, advanced medical education was only available in non-primary care specialties as no primary care specialization existed. The significant number of physicians that took advantage of the GI bill in this manner contributed to the growth of non-primary care specialists and fueled the public’s perception that specialized care was better than generalist care (Starfield & Oliver, 1999; Starfield et al., 2005a).

It was not until the 1960’s that Family Practice was established as an area of specialization requiring advanced training that extended beyond medical school (Starfield et al.,

2005a). This effort was led by a group of general practitioners concerned with preserving and elevating the practice of primary care in the face of a growing number of specialty physicians and a public perception that specialization equated with better health care.

The proliferation of sub-specialization is another important shift that occurred during this period and merits discussion for its impact on primary care specialties. Sub-specialization has become increasingly common with physicians choosing a very narrow focus within a broader field. The number of specialty certificates available through the American Board of Medical Specialties has increased from just 10 in 1969 to more than 150 different specialty or subspecialty certificates in 2017 (American Board of Medical Specialties). The trend toward sub-specialization has special significance for the practice of primary care in that increasing sub-specialization is decreasing the number of “general” internal medicine and pediatric physicians working in primary care roles. The change in Internal Medicine has been the most dramatic with just 12 percent of Internal Medicine residents in the 2017 Match choosing General Internal Medicine with a focus on primary care compared to 54 percent choosing primary care practice in 1998 (Dalen, Ryan, & Alpert, 2018; West & Dupras, 2012).

While the practice of medicine was evolving with a very specialist-driven focus, the financing of health care cost was also changing. With the absence of an over-arching national strategy for the financing of health care costs, the medical industry devised its own solutions. In the years following the Great Depression, it was clear that the cost of hospital care would extend beyond the means of many Americans. Fearing for their future livelihood, hospitals coalesced under the direction of the American Hospital Association (AHA) and created Blue Cross in 1929 as a means of offering affordable insurance coverage for hospital services only. The success of this approach later inspired the development of Blue Shield by the American Medical

Association (AMA) to cover the cost of non-hospital physician provided services. Primary care services were deemed to be affordable for most Americans and Blue Cross plans excluded these services covering specialty and outpatient procedural services only (Sandy et al., 2009).

This omission of primary care services from early Blue Shield coverage laid the groundwork for a reimbursement system weighted in favor of specialists that persists to this day. As the development of other insurance plans followed, the standard convention for determining an appropriate level of provider reimbursement for a service was the “Usual, Customary, and Reasonable” (UCR) amount for a specific service within a small geography (Berenson & Rich, 2010b; Sandy et al., 2009). Concerned about the need to justify the amount charged for particular services and wishing to avoid fee schedules imposed by insurance carriers, physicians in California organized in 1956 to institute a system of Relative Value Units (RVU’s) (Hsiao & Stason, 1979). Health care services were rated by the level of intensity and time involved and assigned a number of RVU’s to which a standard multiplier was applied to arrive at the prevailing cost for any given service. Only services previously covered by insurance (specialty care and outpatient procedures) were included in the RVU formulas (Sandy et al., 2009). Eventually, the RVU was expanded and adopted on a broader national scale covering all services, including primary care, as part of the Resource Based Relative Value Scale (RBRVS) system. The RBRVS system has generally maintained the status quo favoring the payment of specialty services over basic primary care services. This discrepancy is readily apparent when comparing primary care and specialist physician compensation in the U.S. The 2016 median compensation for physicians in non-primary care specialties was \$336,000 which is more than 54 percent higher than physicians working in primary care specialties whose median compensation was just \$217,000 (Medscape Advisors). This income differential is even more notable when the

hours worked by primary care physicians verses specialists is considered. Primary care physicians report working 60 – 70 hours per week while most specialist counterparts are more likely to report working 40 hours – and sometimes even less with fewer after-hours, on-call requirements. With a diminishing number of medical students choosing primary care careers, numerous studies have found income to be the primary factor. Lifestyle and working conditions were frequently cited secondary considerations (Altarum Institute, 2010; Morra, Regehr, & Ginsburg, 2009; R. L. Phillips et al., 2009; Senf, Campos-Outcalt, & Kutob, 2003).

The reduction in the number of primary care physicians is confounded by the increased demands placed on primary care providers today. An aging population, an increasing number of patients with one or more chronic conditions, a growing number of evidence-based guidelines, the proliferation of new medications and a growing (and often-changing) number of preventive service recommendations combine to create an ever-changing and challenging world in which primary care physicians operate (Berenson & Rich, 2010b; COGME, 2010; Grumbach & Bodenheimer, 2002; Ostbye et al., 2005; Sandy et al., 2009; Starfield, 2012; Starfield et al., 2005a). In recognition of these challenges, the Triple Aim aspirations advanced by the IHI have been expanded by many to include a fourth aim – improving the work experience of providers and caregivers (Bodenheimer & Sinsky, 2014). This is oftentimes referenced as the “quadruple aim” although the IHI continues to take an official stance only in support of the Triple Aim while also acknowledging that the Triple Aim cannot be achieved without the full engagement and support of providers and caregivers (Feeley, 2017).

Primary Care’s Role in the Broader Healthcare System

Understanding the broader context or system within which primary care operates is essential to understanding how to best position primary care for success. As previously noted,

many conclusions about the role of primary care in a high-performing healthcare system are derived from international comparisons. The Commonwealth Fund's international comparison of healthcare systems consistently places the U.S. at the bottom of the list (Schneider et al., 2017). This study highlights many differences between the U.S. and other nations that produce better health outcomes at a much lower cost. Many of these differences point to the under-performance of primary care in the U.S. as one of the opportunities for improvement. When considering the role and impact of primary care on aspirational goals, such as the triple or quadruple aims, it is important to be mindful of whether it is the structure or processes within the context of the primary care practice setting that must change or there is a need for primary care to be positioned in a manner that promotes and facilitates its role within the context of the broader healthcare system. Or both?

A closer examination of the top performing international systems reveals that the way in which primary care is promoted and facilitated within those broader systems is fundamentally different than in the U.S. There are two key differences that I wish to highlight - primary care registration requirements and primary care referral requirements for specialty services.

In the 2017 Commonwealth Fund study, the top five ranked countries (U.K., Australia, the Netherlands, and New Zealand and Norway) all require or strongly incent a referral from a general practitioner to access services from a specialist. In the U.K., individuals are required to register with a general practitioner. In the Netherlands and Norway, citizens are not required to register, but those countries report voluntary registration at rates more than 90 percent. Neither of these requirements exists in any systemic manner in the U.S. Health Maintenance Organizations (HMOs) are the only type of insurance plan that requires selection of a primary care physician which would be the U.S. corollary to a primary care registration requirement. While HMOs were

much more prevalent in the U.S. during the managed care era of the 1980's and 90's, less than 15 percent of employers offer an HMO plan option to their employees today (*2017 Employer Health Benefits Survey*). Preferred Provider Organizations (PPOs), Exclusive Provider Organizations (EPOs) and High Deductible Health Plans (HDHPs) constitute more than 85 percent of the employer-sponsored plan offerings. None of these plans typically include any type of PCP selection process or specialty service referral requirement. This is consistent with the approach taken by traditional Medicare coverage. It is very difficult to hold primary care accountable for the health, care, and cost of a patient population when most patients can move freely about the healthcare system from one primary care provider to another or bypass primary care altogether to access specialty care directly.

Holding primary care to the standard of other countries which have requirements such as registration and specialty referral requirements is not an even playing field. It is unlikely that either of those changes will be realized in the U.S. at a systemic level. However, the “integrator” role described by Berwick and his co-authors (2008) is a conceivable concept. Whether the integrator is an ACO, an integrated health system under common ownership or some other integrator type which could include health plans or public/community health organizations, the need for this type of system-level accountability for the care of patient populations is clear (Billieux, Conway, & Alley, 2017; D'Aunno, Hearld, & Alexander, 2017).

The Medical Home as the Solution

The hopes and aspirations that have been attached to the Medical Home model as the change agent needed to return primary care to a more prominent and impactful role in the overall health care system are substantial. To understand whether we are making progress in that regard, it is necessary to effectively evaluate the impact that this model has on a broad range of desired

outcomes including the triple (or quadruple) aims. There is general agreement that the effectiveness of the Medical Home is difficult to measure due to the complexity of the model itself, the variety of ways in which the Medical Home is implemented in practice, and the complicated healthcare environment in which it operates. There are three areas that I would like to highlight as important to understanding the role and impact of the Medical Home in fulfilling the aspirational goals we have for primary care. These three challenges provide the foundation for the questions explored in this dissertation and are as follows:

- 1) Multiple definitions and recognition requirements from multiple sources makes it challenging for practices to understand and implement the Medical Home Model.
 - a. Research Question: How do practices that participate in a commercial Medical Home program differ from non-Medical Home practices?
- 2) The lack of specificity in the Medical Home definitions results in a variety of approaches to implementation of the Medical Home that makes comparisons challenging.
 - a. Research Question: Is being a Medical Home associated with differences in primary care service delivery in a manner consistent with high quality primary care when compared to non-Medical Homes?
- 3) It is unclear how the changing landscape of physician practice ownership will influence implementation and outcomes of the Medical Home model.
 - a. Research Question: Is ownership of Medical Home practices associated with differences in total cost of care and utilization of high-cost services?

1) Multiple Definitions and Recognition Requirements

There are numerous names and definitions that lay claim to this enhanced model of primary care. A systematic review of the literature revealed 29 professional, government, and

academic sources offering varied definitions related to Medical Home (Vest et al., 2010). Some of these names are relatively well known, such as “health home” which is the label given to this model by Medicaid (Centers for Medicare & Medicaid Services, 2013) or “Patient Aligned Care Teams” or “PACT” as the VA refers to its Medical Home program (Veterans Administration, 2013). Others are propriety names such as ProvenHealth Navigator, the Medical Home initiative of the Geisinger Health System (Daniel D. Maeng, 2012).

Despite the specific differences identified through their analysis, Vest et al (2010) found that there was general agreement on a core set of Medical Home features and roles, including coordinated care, access to care, patient-centered care, and continuity of care, the underpinnings of high quality primary care (Cabana & Jee, 2004; Macinko et al., 2003). The Agency for Health Care Research and Quality (AHRQ) has articulated one of the most commonly referenced definitions of the Patient-Centered Medical Home encompassing all of these features in the following manner. (Agency for Healthcare Research and Quality)

The medical home model holds promise as a way to improve health care in America by transforming how primary care is organized and delivered. Building on the work of a large and growing community, the Agency for Healthcare Research and Quality (AHRQ) defines a medical home not simply as a place but as a model of the organization of primary care that delivers the core functions of primary health care.

The medical home encompasses five functions and attributes:

1. Comprehensive Care
2. Patient-Centered
3. Coordinated Care
4. Accessible Services
5. Quality and Safety

Primary care practices have many reasons for pursuing “official” recognition or certification as a Medical Home, one of which is eligibility for new forms of third party payment. Being recognized or accredited as a Medical Home is often required for providers to be eligible

for new payment models associated with the Medical Home. Recognition as a Medical Home can happen in a variety of ways that generally fall into one of two approaches. First, there are individual entities with proprietary Medical Home models, such as CMS' Medicaid Health Home, integrated health systems such as Geisinger or Group Health, or commercial health plans, such as Blue Cross Blue Shield of Michigan that has evaluated and certified more than 2400 Medical Home practices based on its own set of criteria and evaluation process ("Blue Cross Blue Shield of Michigan," ; Sanders, Foster, & Ong, 2011). Secondly, there are national third-party recognition bodies. The first and most influential recognition body is the National Committee for Quality Assurance (NCQA) that has had a Medical Home recognition program in place since 2008. In subsequent years, the Joint Commission, the Accreditation Association for Ambulatory Health Care (AAAHC), and the Utilization Review Accreditation Committee (URAC) have joined in offering their own version of Medical Home certification (Berenson, Devers, & Burton, 2011).

It is easy to see that the number of variations on the theme of "*How does a primary care practice become recognized as a Medical Home and eligible for payment?*" has the potential to be unwieldy and confusing. Consider the overwhelming impact on a single practice that wishes to act as a Medical Home for all its patients that are insured by a variety of different payers. This creates a potentially complex maze of Medical Home requirements advanced by different payers. Understanding whether this creates an unintended deterrent to practice adoption of the Medical Home model is important to its widespread adoption. In my dissertation, understanding how practices in a payer sponsored Medical Home program differ from practices that choose not to participate provides a baseline understanding that can contribute to this discussion and provide a useful framework for further inquiry.

2) Many Approaches to Implementation of the Medical Home

As noted previously, there can be significant variation in how a Medical Home is operationalized in practice. Medical Home definitions tend to include broad principles and general statements more so than specific operational requirements. In my experience working with a commercial health plan Medical Home program, I have observed firsthand significant variation in how practices have addressed coordination of care. For example, some practices have hired a care coordinator to supplement existing clinical personnel while others have divided this task across existing roles throughout the practice. Still others have chosen to focus on enhanced access before addressing care coordination. The many different manifestations observed in practice and the ability to measure the “Medical Homeness” consistently across real-life settings means that any results that are produced will be applicable only to that manifestation of the Medical Home (Crabtree et al., 2011; Hoff, Weller, & DePuccio, 2012). Including more qualitative studies that attempt to answer the question “What works for whom in what setting?” can help to mitigate this issue (Berwick et al., 2008; Pawson, Greenhalgh, Harvey, & Walshe, 2005).

If we hope to understand in what ways the Medical Home impacts the patient experience, health outcomes or cost, then it will be important to understand what care processes and/or practice capabilities are contributing to observed outcomes. This can be accomplished through understanding what specific changes are made at the practice level or through qualitative inquiry as suggested above. It can also be accomplished by evaluating practice patterns - what services are being delivered and to whom. For example, continuity of care could be demonstrated by assessing whether patients have more primary care visits within a single primary care practice setting relative to the volume and timing of specialist services received. My dissertation

addresses this question by examining how physician-level practice patterns differ between Medical Home and non-Medical Home practices in ways that are consistent with high quality primary care.

3) The Influence of Practice Ownership

It is unrealistic to expect the Medical Home to stand alone in its efforts to achieve the aspirational goals as stated in the Triple Aim without substantive changes in other parts of the health care system. Consider that primary care, the most under-valued segment of the overall health care system, represents just six percent of total health care spending (Grumbach, 2013). It is improbable that a primary care practice can substantially influence the spending on the other 94 percent of health care completely on its own when 32 percent is hospital care, 17 percent goes to non-primary care specialist physician and clinical services including therapies and chiropractic medicine, 19 percent is for home health, durable medical equipment and other long term care services, 10 percent is spent on prescription drugs, eight percent goes toward administrative expenses with the remaining eight percent distributed across dental care and other personal healthcare services (Center for Medicare and Medicaid Services, 2017).

It is more likely that the Medical Home is foundational to the aspirations of an integrated system of care. The final report of the IOM Committee on the Future of Primary Care in 1996 laid out the “road map” for primary care with five key assumptions, one of which was that *“The trend toward integrated health care systems in a managed care environment will continue and will provide both opportunities and challenges for primary care”* (Primary Care: America's Health in a New Era, 1996). That “system” may take the form of an Accountable Care Organization (ACO) which builds on the innovative approaches to care demonstrated by Medical Homes such as team-based care, patient outreach and care coordination (“Patient-Centered

Primary Care Collaborative," 2017). However, in the shifting landscape of physician practice ownership today, the context within which the primary care practice operates is more likely to be the hospital or health system that owns the primary care practice or employs the primary care physicians.

There has been a notable shift away from physician-ownership of practices over the last 30 years. The American Medical Association's Physician Practice Benchmark Survey reported that for the first time in 2016, fewer than half of practicing physicians owned their own practice (C. K. Kane, 2017). Understanding the motivations behind hospital and/or health system acquisition of physician practices will provide insights into whether this strategy creates opportunities or challenges for primary care. Historically, hospitals' desire to increase market share by gaining much needed referrals for admissions, diagnostic testing or other hospital-based services has spurred the growth in physician employment (Kocher & Sahni, 2011; A. S. O'Malley & Reschovsky, 2011). In more recent years, it has been suggested that as provider payment shifts to population based models, forward thinking hospitals and health systems view aligning with primary care as foundational to their future success (Rodriguez, Knox, Hurley, Rittenhouse, & Shortell, 2016).

Berwick, et al (2008) envisioned, in what they described as a "lighter moment", a Triple Aim test which consisted of three items and answers the question "*How would we know at first glance that the care for populations is actually making progress on the Triple Aim?*" The first of the three proposed items is that hospitals aspiring to achieve the Triple Aim would be "trying to be emptier not fuller" and would consider it a "success" that the hospital is less often needed (Berwick et al., 2008). How hospitals or health systems view ownership of primary care physician practices might also be revealed in a similar fashion. The impact that hospital or health

system ownership has on the total cost of care and/or utilization of services could be considered a proxy for this question. There is some evidence that hospital/system ownership of physician practices is associated with higher cost of care (Baker, Bundorf, & Kessler, 2014; Robinson & Miller, 2014). This is particularly true in cases when there is significant hospital consolidation that results in a less competitive healthcare market (Austin & Baker, 2015; Baker, Bundorf, Royalty, & Levin, 2014). The subject of practice ownership is important to the consideration of the Medical Home as some primary care physicians view the requirements to implement this new model as creating burdens that make ownership or employment by a hospital or health system an attractive alternative. My dissertation evaluates the influence of hospital/health system ownership of Medical Home practices on the total cost of care and the utilization of high-cost services – Emergency Department Visits and Hospital Admissions.

Dissertation Research Objectives

The primary objective of this dissertation is to contribute to the understanding of which primary care practices are most likely to adopt the Medical Home model, whether its implementation is associated with care delivery indicative of high quality primary care when measured at the physician-level, and the influence that practice ownership has on total cost of care and utilization outcomes by studying a single market setting. The research is based on data derived from a health plan sponsored Medical Home program that provides both financial and non-financial resources in a 32-county service area spanning two states and encompassing a single large metropolitan area. The focused geographic scope of this research provides for a more controlled study of the practice characteristics that influence which practices choose Medical Home implementation compared to those who do not, the influence Medical Home implementation has on physician-level primary care practice patterns that are indicative of high

quality primary care and the influence that primary care practice ownership has on outcomes of interest to health care purchasers – the total per capita cost of care and the utilization of high-cost services.

Figure 1 provides an overview of the three primary research questions. They are presented in the context of the environment in which they are implemented and studied. While the framework notes the importance of these environmental influences to specific questions, this dissertation is limited in its ability to directly analyze the influence of specific environmental or contextual factors beyond practice ownership which is the primary predictor variable in the third question. Understanding this important organizational consideration makes a valuable contribution to our understanding of the role practice ownership may be playing in Medical Home performance evaluations. Table 1 outlines each of the environmental factors noted in this framework along with an overview of the way in which it may empower or hinder Medical Home adoption, implementation, or performance.

Chapters 2-4 present an overview of each of these questions with the findings and opportunities for further study outlined in Chapter 5. It is my hope that this research provides the foundation for greater inquiry and continued growth of primary care in the Greater Kansas City region and in other communities across the country.

Figure 1: Medical Home Dissertation Conceptual Framework

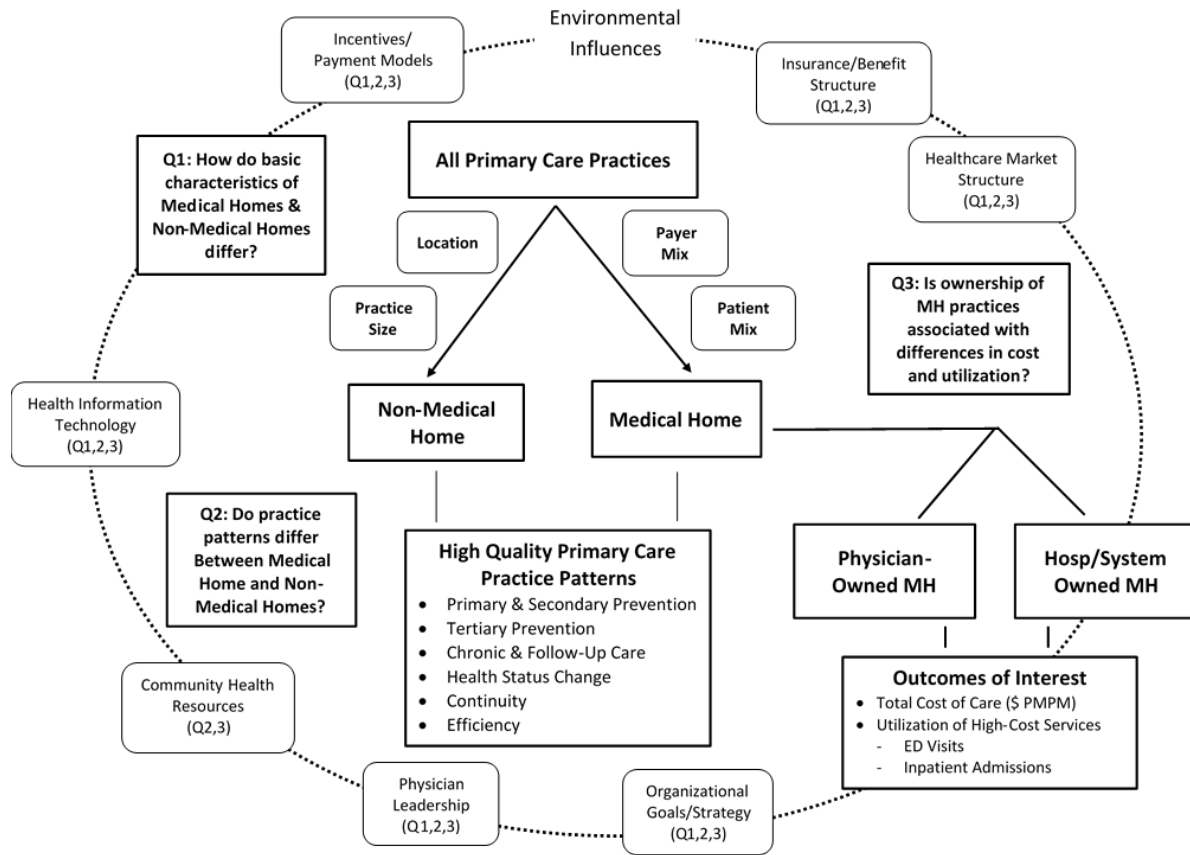


Table 1: Environmental Factors and Medical Home Influence Summary Discussion

Environmental Factor	Medical Home Influence	
	Empowering	Limiting
Incentives/Payment Models	<ul style="list-style-type: none"> • Care Management Fees • Shared Savings (in the short-term) • Quality Bonuses 	<ul style="list-style-type: none"> • No transformation incentives • Primary care incentives being used for other purposes by hospital/system owners
Health Information Technology	<ul style="list-style-type: none"> • Electronic Health Record (EHR) with patient registry • Community-level Health Information Exchange (HIE) with Admission, Discharge, and Transfer (ADT) alerts • Community performance benchmarks 	<ul style="list-style-type: none"> • Payer-specific performance reports • None or limited EHR functionality
Physician Leadership	<ul style="list-style-type: none"> • Engaged physician leaders who are committed to MH principles 	<ul style="list-style-type: none"> • Implementing Medical Home solely for financial reasons
Community Health Resources	<ul style="list-style-type: none"> • Strong public health infrastructure, i.e. community health workers, behavioral health • Community data-sharing; HIE 	<ul style="list-style-type: none"> • Absence of HIE, i.e. no ADT alerts • Siloed public health efforts
Insurance/Benefit Structures	<ul style="list-style-type: none"> • HMO or other primary care oriented insurance plans that require PCP selection and referrals for specialty services 	<ul style="list-style-type: none"> • No PCP selection or referral requirements in insurance plans
Healthcare Market Structure	<ul style="list-style-type: none"> • Consolidated IF dominant market force(s) works toward truly integrated system delivery model 	<ul style="list-style-type: none"> • Consolidated or Competitive IF dominant market force(s) seek FFS revenue maximization with high-intensity specialty and hospital-based service model
Practice Ownership	<ul style="list-style-type: none"> • Physician-Owned practices with committed, engaged physician leaders • Hospital/Health System-Owned IF owner system seeks primary care ownership to create more integrated, efficient delivery model 	<ul style="list-style-type: none"> • Hospital/Health System-Owned IF owner system seeks primary care ownership to maximize FFS revenue stream with referrals to high-intensity specialty and hospital-based services

Chapter 2: How do Basic Characteristics of Medical Home Practices and Non-Medical Home Practices Differ?

Introduction

The importance of a strong primary care foundation to a high-performing healthcare system is well documented (Macinko et al., 2003; Starfield, 2012; Starfield et al., 2005a). International health system comparisons highlight many of the shortcomings related to primary care in the U.S, such as poor access to care when needed and inadequate care coordination (Berwick et al., 2008; Commission on a High Performance Health System, 2007; *Why Not the Best? Results from the National Scorecard on US Health System Performance*, 2011). Improving the delivery of primary care has long been viewed as essential to the fundamental reform of the U.S. health care system (Bodenheimer et al., 2002; Caminal et al., 2004; Martin et al., 2004; R. L. Phillips, Jr. & Bazemore, 2010). In the ten years since the launch of the Patient-Centered Primary Care Collaborative (PCPCC) in 2006 and the signing of the Joint Principles of the Patient-Centered Medical Home (Medical Home) in 2007, this primary care model has been promoted by many as essential to the transformation of the US healthcare system (Berenson et al., 2008; Bodenheimer & Pham, 2010; Meyers & Clancy, 2009). Primary care has long been focused on the broad healthcare needs of the patient rather than a specific disease, function, or body part, which is part of what sets it apart from other medical specialties. The Medical Home model seeks to change the framework of primary care from an episodic, office visit orientation to a physician-led team approach of comprehensive, coordinated, and continuous care that supports this focus on the needs of the whole person. This model has been widely endorsed by healthcare purchasers, including labor and consumer groups, while being tested by many public and private health plans (Berenson et al., 2008; Sepulveda, Bodenheimer, & Grundy, 2008; Sessums,

McHugh, & Rajkumar, 2016) As of January 2018, more than 13,800 primary care practices were recognized by NCQA as Patient-Centered Medical Homes.

Since the introduction of the Medical Home model, other important policy shifts are also placing greater emphasis on primary care. Most notably, the Affordable Care Act (ACA) includes a number of provisions that are intended to strengthen the nation's primary care foundation including higher payment levels for primary care services, explicit financial and non-financial support for advanced primary care models such as the Medical Home and the exploration of new payment and delivery models through the Center for Medicare and Medicaid Innovation (CMMI) (Davis, Abrams, & Stremikis, 2011). Since the passage of the ACA in 2010, Medicare, which represents 20 percent of total healthcare spending, has consistently emphasized primary care payments with increases to the underlying fee schedule and the introduction of new primary care payment codes, such as the chronic care management and transitional care codes ("Chronic Care Management Services Fact Sheet," 2016; "Fact Sheet," 2016). The 2017 Physician Fee Schedule continues in this mode by increasing payment for chronic care management and behavioral health services delivered in a primary care setting.

Most recently, CMS has promoted primary care innovation with numerous pilots including the Comprehensive Primary Care initiative (CPCI) launched in 2012 followed by a much more expansive Comprehensive Primary Care Plus (CPC+) initiative that started in January 2017. The care delivery models underlying CPCI and CPC+ are very aligned with the Medical Home model and focus on building a more advanced primary care delivery system by bringing together commercial health plans, Medicaid agencies and traditional Medicare as payer partners in specific regions (Sessums et al., 2016). Early results from CPCI through 2014 (two years post implementation) showed improvements in the management of high risk patients,

enhanced access to care and some areas of patient experience, but no change in Medicare spending (Dale et al., 2016). Through 2016, quality and patient experience measures continue to show modest improvement with financial results highly varied by region (Centers for Medicare & Medicaid Services, 2017). The aim of CPC+ is to strengthen primary care by aligning primary care payment and performance measurement, including common quality measures and data collection methods (Anglin, Tu, Liao, Sessums, & Taylor, 2017). Payment and measurement are focused on the development of five core primary care functions including: 1) Access and Continuity, 2) Data-Driven Population Health Management, 3) Patient and Caregiver Engagement, 4) Comprehensive and Coordinated Care and 5) Care Management ("CPC+ Care Delivery Brief," 2017).

Success under advanced primary care models requires payers, both public and private, to support primary care in new and expanded ways. This is happening through new payment models as well as the use of health information technology and new approaches to data sharing to equip primary care providers with all the information needed to truly manage the health of their patient population. Primary care practices are called upon to re-examine their existing staffing models. Practice structure and the processes that support patient care must be re-engineered to deliver the kind of accessible, continuous, and coordinated care envisioned under advanced primary care models, such as the Medical Home. Early findings suggest that the efforts required by primary care physicians and their staffs to truly transform their approach to care delivery is significant and typically spans many years (Crabtree et al., 2010; P. A. Nutting et al., 2010).

An important question that proponents of advanced primary care models must ask is whether the staffing, process and technology changes required to transform to an advanced

primary care model may be too much for some practices to tackle (Fleming et al., 2017; D. R. Rittenhouse et al., 2011). This is especially important in the context of the sea change of legislative and policy changes that have occurred over the last several years - starting with the Health Information Technology for Economic and Clinical Health Act (HITECH) in 2009 to the more recent Medicare Access and CHIP Reauthorization Act of 2015 (MACRA). The effort required to comply with these new mandated changes in the use of health information technology and quality reporting are substantial and, in many cases, will supersede a primary care practice's ability to tackle the staffing and process changes necessary to the kind of care envisioned under the Medical Home model.

Understanding the differences between primary care practices that pursue transformation to an advanced primary care model such as the Medical Home, verses those that do not, is essential to identifying the best approach to expanding the adoption of new models like the Medical Home that support the creation of a strong primary care foundation. Strengthening primary care is essential to a high functioning US healthcare system capable of achieving its aspirational "Triple Aim" healthcare goals of improved population health, lower per capita spending and a better patient experience and that means these models must be embraceable by all primary care practices regardless of size, geography or other factors (Berwick et al., 2008; D. Peikes, Zutshi, Genevro, Parchman, & Meyers, 2012).

Study Setting

In 2010, Blue Cross and Blue Shield of Kansas City (Blue KC) launched the Blue KC Medical Home Program. To be eligible for Blue KC's Medical Home program, practices must achieve National Committee for Quality Assurance (NCQA) Level 2 or 3. Blue KC Medical Home practices receive both financial and non-financial support. Financial support includes an

enhanced fee-for-service rate schedule and a per member per month payment that is adjusted to reflect the health status of the member as well as the cost and quality performance of the Medical Home practice to which the member is attributed. The financial resources are intended to support the infrastructure and staffing changes necessary to implement new Medical Home activities such as care coordination, registry functions within the practice EMR, expanded hours or flexible scheduling options.

Supporting practices in non-financial terms can be just as important to a developing Medical Home as financial payments (Patel, Rathjen, & Rubin, 2012; Reid et al., 2009; Reid & Wagner, 2008). Blue KC offers many non-financial support mechanisms such as practice facilitators who support practice efforts to redesign work flows and/or incorporate new roles and population health management tools that provide access to population-based reports that highlight patients with gaps in care or poor utilization patterns such as frequent ED visits.

In recognition of the important role primary care practices play in the health of patients with chronic conditions, Blue KC redeployed a small number of disease management nurses as Primary Care Nurse Coordinators whose primary purpose is to transition traditional health plan-based disease management functions to a more effective, practice-based chronic care management approach. This allows the health plan to redeploy its resources in support of physician-led disease management efforts focused on the practice's attributed members. Resources previously spent on direct mailings, calls and other outreach by Blue KC were redirected toward the physician led care team to whom the member is attributed. This is not only empowering to Medical Home practices, it is consistent with the reality that patients much prefer health advice from their physician or physician's office over their health plan (Casalino et al., 2014; Doty, Fryer, & Audet, 2012; Patel et al., 2012).

The Blue KC Medical Home started as a pilot in 2010 with approximately 160 physicians practicing in 38 locations. Five years later in 2015, the Blue KC Medical Home program includes more than 600 physicians practicing in 125 locations across its 32-county service area spanning Missouri and Kansas. While the growth in the number of physicians and practices participating in Blue KC's Medical Home program is impressive, as of December 2015 there were an additional 850 physicians practicing in 362 locations across Blue KC's service area that had not elected to participate in this program despite the generous support structure offered for participation. If the goal is to transform primary care for all, understanding more about the nature of the physicians and practices and their participation choices is an important first step toward building an approach that is conducive to engaging all primary care physicians.

Study Design and Data Sources

The study data include both practice and physician-level demographic information as well as associated patient population information drawn from Blue KC's enterprise data warehouse (EDW) as of December 2015. The provider dataset includes all primary care practices and physicians contracted with Blue KC across its full 32-county service area in the states of Missouri and Kansas.

Primary care practices participating in the Blue KC Medical Home program were compared to those not participating in this program across a range of practice, physician, and member characteristics to identify differences between these two groups.

Member Attribution to Primary Care Physicians

Attribution identifies the health plan members for whom each provider is held accountable and is an important foundational element of any population-based health

management model, such as the Medical Home. Blue KC uses a retrospective, claims-based attribution methodology. Eligibility for attribution requires members to be active as a primary member and includes individuals enrolled directly with Blue KC on or off the exchange, employees enrolled through a group and dependents that do not have other coverage that is considered primary. For this analysis, members must be between 18-64 years of age due to the limited representation of pediatricians in the Blue KC Medical Home program and the low number of active, primary members over the age of 65 among its commercial members.

The attribution process links members to eligible primary care physicians by identifying patient visits with eligible CPT Evaluation & Management (E&M) Codes (99201-99499) within the most recent 24 months. The member is attributed to the primary care physician with the most eligible office visits. In the event of a tie, the member is attributed to the primary care physician seen most recently for an eligible visit. This process occurs for all primary care physicians regardless of their participation status in the Blue KC Medical Home.

Member Risk Adjustment & Health Status

In order to make comparisons across providers that are not influenced by the underlying health of the population attributed to each provider or practice, Blue KC utilizes Clinical Risk Groups (CRGs), a proprietary risk-adjustment methodology developed by 3M Health Information Services to classify the risk-level of its individual members (*3M Clinical Risk Groups: Measuring Risk, Managing Care*, 2011). The CRG methodology relies on medical and pharmacy claims data that can be linked to a unique individual over time. The specific data elements that are used in this process include the following:

- Principal diagnosis coded in ICD-9-CM
- Secondary diagnoses coded in ICD-9-CM

- Procedures coded in ICD-9-CM
- Age
- Sex
- Zip Code

The CRG classification methodology assigns a risk score and sorts individual patients into one exclusive health status category based on a clinical framework informed by claims history. It has been used and independently evaluated in a variety of public and private settings including Medicaid, Medicare and commercial populations. (*3M Clinical Risk Groups: Measuring Risk, Managing Care*, 2011) Member health status was further categorized as Healthy, Stable, At Risk, Simple Chronic, Multiple Chronic, Complex Chronic, and Critical.

Geographic Setting

Blue KC operates on a regional basis surrounding Kansas City. The service area encompasses 32 counties in Missouri and Kansas. The Greater Kansas City metropolitan area is comprised of five counties – Clay, Jackson, and Platte in Missouri along with Johnson and Wyandotte in Kansas. For this study, these five counties were designated as urban with the remaining 27 counties, all of which are in Missouri, defined as rural.

Practice Size

Recognition as a Medical Home is granted at the practice level. For this analysis, the number of physicians practicing at each site was used to calculate practice size. Physicians can practice at more than one location. The provider data set available from the health plan did not include a practice site identifier for all non-Medical Home practices. A variable to identify practice site was developed using alternative information available in the data set including place of service and unique provider IDs. Practice site information was included in the data set for all physicians working in Medical Home practices. Also of note is that Physician Assistants and

Advanced Registered Nurse Practitioners were not included in the calculation of practice size in this study. While mid-level providers are very important to the implementation of team-based care in the Medical Home model, Blue KC does not attribute members to mid-level providers and they were not included in the data used for this analysis.

Analytic Approach

Physician-level demographic data including age, gender and primary care specialty were combined with member level attribution data including age, risk adjustment score and health status. These data were collapsed based on the practice location at which the member was attributed to the physician. Practice level characteristics including geographic setting, the number of physicians, the number of attributed members and the number of attributed members per physician were compared across Medical Home and non-Medical Home practices.

All analyses are based on Blue KC's reported member attribution status as of December 2015. Using t-tests for differences in means and Chi-squared tests for categorical distributions, the Medical Home and non-Medical Home practices were compared across member, physician, and practice characteristics to understand the differences between these two groups (see Table 1). Multivariate logistic regression was used to analyze the associations between the following practice characteristics: geographic setting (urban vs. suburban), practice size (# of physicians), the number of Blue KC members attributed per physician in the practice, as well as the mean age and the mean risk score of the Blue KC members attributed to the practice (Table 2).

Results

This study included 497 primary care physician practice locations across Blue KC's 32-county service area. There were 1,552 physicians practicing at 497 locations included in this

study. Physician-level characteristics included in the study were provider age, percent female, and primary care specialty. There are 229,541 Blue KC members attributed as patients to the physicians and practices included in this study. Member characteristics included in the analysis are member age, and CRG risk score.

When comparing the members attributed to Medical Home physicians and non-Medical Home physicians, it does not appear that patients with unique characteristics are self-selecting into a Medical Home practice as no significant difference was found in members' age or risk score. The distribution of attributed members' health status is consistent across Medical Home and non-Medical Home practices with the most notable difference being that 24 percent of Medical Home members fall into the "Simple Chronic" category compared to 22 percent of non-Medical Home members. The distribution of members across these health status categories was found to be statistically different using a Chi-squared test ($p < 0.0001$), but the difference is not large enough to suggest that it has a meaningful impact.

All differences in physician characteristics were found to be statistically significant ($p < .05$) except for the percentage of female physicians ($p > .05$). The percentage of female physicians practicing in Medical Homes is 32 percent compared to 27 percent in non-Medical Home practices. The most notable difference between the two comparison groups is the average number of Blue KC attributed members per physician with Medical Home physicians at 241 members and non-Medical Home physicians averaging 91 members per physician. ($p < 0.0001$) Physicians in Medical Home practices are younger by 1.5 years ($p < .05$) and more likely to practice in an urban setting ($p < 0.0001$).

All differences in practice characteristics were found to be significant ($p < 0.0001$). The size of the Medical Home practice is relatively small at an average of five physicians per

practice, but is still more than twice the size of the non-Medical Home practices in the comparison group that average 2.4 physicians per practice. Looking at the distribution of practice size in categories from “solo” to more than ten physicians reveals a significant difference in the number of solo practices with 57 percent of non-Medical Home practices in this category compared to just 19 percent of Medical Home practices. Medical home practices are more concentrated in an urban setting with 77 percent of all Medical Home practices in the five-county metro area compared to 52 percent of non-Medical Home practices.

Discussion

The study results support the hypothesis that smaller practices, as measured by the number of practicing physicians, are less likely to participate in health plan sponsored programs requiring patient-centered Medical Home recognition status (Table 2). Using multivariate logistic regression with odds ratios, we find that larger practices are 124 percent more likely to be Medical Homes (OR: 2.24, 95% CI: 1.81 – 2.78) and that practices situated in an urban setting are 119 percent more likely to participate be Medical Homes (OR: 2.19, 95% CI: 1.27-3.78). The number of attributed members per physician (measured in units of 10 attributed members per physician) was also found to be statistically significant (OR: 1.06, 95% CI: 1.05-1.08). Member characteristics, including the age of the patient population and risk status (CRG risk score) were associated with odds ratios close to one and did not have a statistically significant influence on the likelihood of Medical Home status.

The difference in the practice size between Medical Home and non-Medical Home practices is striking with solo practices representing just 19 percent of the Medical Home practices compared to 57 percent of the non-Medical Home practices. At the other end of the size

spectrum, 22 percent of the Medical Home practices have seven or more physicians with just four percent of the non-Medical Home practices in that size range.

There is no clear “go to” data source by which to benchmark primary care practice size (Casalino et al., 2014; C. Kane, 2015; D. R. Rittenhouse et al., 2011). Due to the alignment of the Medical Home model with the CPCI and CPC+ primary care model, it is helpful to compare the results of this study with information derived from an in-depth analysis of practice structure among CPCI practices published in 2014. This study found that “like most US practices, most CPCI practices were small, with an average of 3.7 physicians” (D. N. Peikes et al., 2014). In this study, we found that Medical Home practices averaged five physicians per practices. This is twice the number of physicians in non-Medical Home practices which averaged just 2.4 physicians per practice in this study.

To understand how practice size might impact adoption and implementation of an advanced primary care model, such as the Medical Home, a recent study found that among practices ranging from 1-19 physicians, practices with seven or fewer physicians incorporated significantly fewer Medical Home processes than larger practices (D. R. Rittenhouse et al., 2011). However, using this same data set, a more recent study found that smaller practices were more successful at avoiding preventable hospital admissions. The authors reported that when compared to practices with 10-19 physicians, practices with 1-2 physicians had 33 percent fewer preventable admissions and practices with 3-9 physicians had 27 percent fewer (Casalino et al., 2014). These conflicting findings suggest that the answer to success as a Medical Home – or any other advanced primary care model - is much more complex than simply practice size.

This same study also found that hospital ownership influenced a higher level of adoption of Medical Home processes (Casalino et al., 2014). Whether a primary care practice is physician

owned or employed by a hospital or health system is worthy of consideration as there may be both quality and cost considerations related to whether a practice is independent or hospital owned (A.S. O'Malley, Bond, & Berenson, 2011). The ownership status of the practice may also influence the choice of whether to pursue Medical Home transformation. Among all Medical Home practices included in this study, a hospital or health system own 57 percent.

Unfortunately, a reliable indicator to determine ownership of the non-Medical Home practices was not available in the health plan data used for this study. As noted across the physician practice literature and in the common press, the shift from independent physician practices to a hospital/health system owned or employed model is a growing trend and an important consideration in the delivery of care (Casalino et al., 2014; C. Kane, 2015). If hospitals and health systems are acquiring practices and employing physicians to shore up referrals to support the delivery of high-cost services, this trend will undoubtedly hamper the movement toward value-based population-centric models focused on achieving the Triple Aim health care goals of “better care, smarter spending and healthier people.” If the converse is true, the trend toward hospital or health system ownership will begin to produce more favorable outcomes. I examine this question more closely in Chapter Four.

One of the notable differences between the comparison groups in this study is that there are substantially more Blue KC attributed members per physician in Medical Home practices (241) when compared to non-Medical Home practices (91). The number of attributed members per physician can be considered a proxy for the influence of that payer. This study finds that an increase of 10 attributed members per physician increases the likelihood of being a Medical Home by six percent. While the mean number of attributed members in Medical Home and non-Medical Homes is substantially different and statistically significant, it is also important to keep

in mind that the average panel size for a primary care physician is approximately 2,300 patients (Altschuler, Margolius, Bodenheimer, & Grumbach, 2012). When considered in the context of the full panel, one payer exerts a relatively minor influence on a single physician. The 2016 distribution of healthcare spending by funding source (or payer) underscores this point with Medicare representing a 20 percent share, Medicaid at 17 percent, patient out-of-pocket costs accounting for 11 percent, and commercial payers with the largest share at 34 percent (Center for Medicare and Medicaid Services, 2017).

How the number of attributed members is determined and what factors influence that result is something that may be under-appreciated in the Medical Home literature. This becomes increasingly important as the commercial insurance market continues to shift away from Health Maintenance Organization (HMO) benefit plans that require members to select a primary care physician as a condition of plan enrollment. Less than 15 percent of commercial plans offered by employers were HMOs in 2016 (*2017 Employer Health Benefits Survey*). The percentages are lower for Missouri (five percent) and Kansas (eight percent). The remaining plan types, Preferred Provider Organizations (PPOs), High-Deductible Health Plans (HDHPs) and Exclusive Provider Organizations (EPOs) which make up the balance of plans offered by employers, do not typically require members to select or identify a primary care physician at enrollment. Claims data are used to identify the primary care physicians from whom members are seeking care and to “attribute” members to physicians accordingly. This is an inexact, evolving approach that merits further study and understanding. If the success of the Medical Home, or any other advanced primary care model, is inherently aligned with the attributed members (patients) in each practice setting, considering the benefit structures or incentives in place at the patient level

may be as important as the financial incentives and structures in place at the physician and/or practice level.

The number of attributed members per physician may also be influenced by the size of the health plan network. The backlash of the 1980's managed care era produced a movement toward broad, inclusive provider networks. While there is much discussion about the merits of "high-performance networks" which are usually smaller in size and made up of providers that achieve specific cost and quality performance thresholds, the actual shift toward these network structures has been slow. Among large employers, just 15 percent included a "high performance or tiered network" in 2016, nine percent offered a "narrow network" (small in size without any specific cost or quality inclusion parameters for providers) and just three percent stated that their health plan eliminated hospitals or health systems from a network in exchange for a cost reduction (*2017 Employer Health Benefits Survey*). If health insurance purchasers continue to seek broad networks which offer a range of provider choices to members, the ability for a single payer to gain the penetration within a given physician practice to the degree that it influences provider behavior will be limited.

Conclusion

Based on the findings in this study, larger, urban practices with a strong payer affiliation (defined as more patients identified as "attributed members" with that payer) are more likely to become Medical Homes. This finding underscores the need to understand the barriers (both real and perceived) for smaller, more rural practices to become Medical Homes. Successfully incorporating and deploying all the Medical Home requirements may be daunting to a small practice. For example, the type of staff required to support patients with complex healthcare

needs in the manner envisioned by advanced care models such as the Medical Home suggests that practices should be using specialized team members including social workers, behavioral health specialists, dietitians, health educators and others. Many patients with chronic conditions can benefit from additional support that is not considered reimbursable under the traditional fee-for-service payment structure and often not available at an individual practice level, particularly a smaller practice. Small practices may not have the resources to provide these specialized staff resources for patients, especially when we know that the greatest need for these types of services is highly concentrated in a small number of patients with complex needs (Schoenman, 2012).

A commercial payer that wants to support advanced primary care models on behalf of its members may want to consider the development of shared resources that are unlikely to be implemented or available at an individual practice level. If the delivery of primary care continues to rest primarily in the hands of physicians in small practice settings, it is incumbent upon payers and providers to work together to develop new and innovative approaches that work for smaller practices. Understanding the approach that small practices have taken to Medical Home transformation and evaluating the level of success on improving desired cost and quality outcomes can lead to insights that will further the evolution of advanced primary care models in the U.S.

The findings of this study also suggest that we need to look beyond the practices themselves and understand the nature and context of the insurance market within which patients operate. If the number of attributed members per physician can be viewed as a proxy for payer influence on Medical Home participation, understanding how to strengthen that influence is an important consideration. The kind of payer collaboration advanced in the CPCI and CPC+ programs is an example of how payers can work together to align payment methodologies,

quality measurement and data collection methods inherent in new population-based payment models to ease the burden on practices (Anglin et al., 2017). If payers can work together in ways that benefit providers and members, it is likely to enhance their respective ability to compete in the insurance markets rather than impeding it.

In the absence of this kind of payer collaboration, the influence of a single payer, even those with strong market share, will be limited. This is particularly true if the preference toward broad provider networks persists and benefit designs do not require member commitment to a primary care physician. Payers will need to balance employer and member preferences around network size, choice, and unrestricted freedom of movement across physicians with their desire to engage physicians more actively in programs that rely on payer and provider collaboration focused on the needs of attributed populations.

Table 1: Characteristics and Differences of Members, Physicians, and Practices

	Medical Home	Non-Medical Home	Difference	p value ¹
Member Characteristics (n)	157,616 (69%)	71,925 (31%)		
Member Age	46.6	46.5	0.1	0.0713
Member Average Risk Score (CRG)	1.56	1.59	-0.03	0.1886
Member Health Status				
Healthy	7,909 (5%)	4,119 (6%)		
Stable	36,819 (23%)	17,281 (24%)		
At Risk	7,421 (5%)	3,337 (5%)		
Simple Chronic	37,745 (24%)	15,790 (22%)		
Multiple Chronic	44,179 (28%)	19,808 (28%)		
Complex Chronic	21,754 (14%)	10,445 (15%)		
Critical	1,789 (1%)	1,145 (2%)		0.000
Physician Characteristics (n)	683 (44%)	869 (56%)		
Provider Age ²	49.6	51.1	-1.5	0.0348
Percent Female	216 (32%)	236 (27%)	-20	0.0545
Primary Care Specialty				
Family Practice	442 (65%)	538 (62%)	3%	
General Practice	3 (0%)	33 (4%)	-4%	
Geriatrics	3 (0%)	2 (0%)	-%	
Internal Medicine	210 (31%)	221 (25%)	6%	
Pediatrics	25 (4%)	75 (9%)	-5%	0.000
Blue KC Attributed Members/ Physician	240	91	149	0.000
% Urban (w/in 5 county KC Metro)	525 (67%)	454 (52%)	-15%	0.000
Practice Characteristics (n)	135 (27%)	362 (73%)		
Average Number of Physicians/Practice	5	2.4	2.6	0.000
Practice Size				
Solo Practice	26 (19%)	208 (57%)	-38%	
2-3 physicians	37 (27%)	98 (27%)	0%	
4-6 physicians	42 (31%)	40 (11%)	20%	
7-9 physicians	15 (11%)	9 (2%)	9%	
10 or more physicians	15 (11%)	7 (2%)	9%	0.000
Percent Urban (w/in 5 county KC Metro)	104 (77%)	189 (52%)	25%	0.000
Blue KC attributed members per practice	1168	199	969	0.000

Notes:

¹ Difference in means across Medical Home practice status tested using t test; difference in categorical distribution tested using Chi² test.² The sample size for provider age is different due to missing observations; Medical Home n = 550, Non-Medical Home n = 616.

Table 2: Logistic Regression: Characteristics Associated with Medical Home Practices compared to Non-Medical Home Practices

Practice characteristics	Odds Ratio	Confidence Interval	P value	Standard Error
Practice size (# of physicians)	2.24	1.81 - 2.78	0.009	.245
Urban practice setting	2.19	1.27 - 3.78	0.005	.609
# of attributed members per physician	1.06	1.05 - 1.08	0.009	.009
Risk weight (CRG score) of attributed members	1.03	.95 – 1.11	0.552	.397
Age of attributed members	1.01	.95 - 1.07	0.787	.031

The sample includes 497 primary care practices (family practice, internal medicine, pediatrics, general practice, and geriatrics) with the Medical Home status of the practice being the outcome of interest. Independent variables included in the model are practice size, categorized by the # of physicians at each location, whether the practice is situated in an urban setting (5-counties comprising greater Kansas City including Clay, Platte, Jackson, Johnson, and Wyandotte), the mean # of Blue KC members attributed per physician, the mean risk weight and mean age for the members attributed to each practice. Logistic regression with robust estimation was used to estimate the likelihood of Medical Home status. The pseudo R2 = .2915

Chapter 3: Do Physician Practice Patterns Differ Between Medical Home and non-Medical Home Practices?

Introduction

Primary care has long been regarded as an essential ingredient to a high performing health care system (Macinko et al., 2003; Rawaf, De Maeseener, & Starfield, 2008; Starfield et al., 2005a). There has been a growing recognition in the U.S. over the last 30+ years that the primary care foundation upon which the U.S. healthcare system relies has become increasingly unstable (Rawaf et al., 2008; Sandy et al., 2009; Starfield, 2009; Starfield & Oliver, 1999). Over the last ten years, since the creation of the Patient-Centered Primary Care Collaborative (PCPCC) in 2006 and the signing of the Joint Principles (Joint Principles) of the Patient-Centered Medical Home (Medical Home) in 2007, the primary care professional societies and large employers have enlisted others in their collective efforts to spread adoption of the Medical Home model ("Patient-Centered Primary Care Collaborative," 2017). Studies to understand if and how the Medical Home model is contributing to the achievement of the aspirational triple goals for healthcare in the U.S. have proliferated (Berwick et al., 2008; Jabbarpour, DeMarchis E, Bazemore, & Grundy, 2017).

The Committee on the Future of Primary Care convened by the Institute of Medicine (IOM) in 1994 created a definition of primary care that continues to be relevant in today's discussions about the impact that Medical Home implementation is having on the development of a more robust primary care system in the U.S. The interim report published in 1994 created the following definition of primary care: (Note that terms in bold below were italicized in the original publication)

*Primary care is the provision of **integrated, accessible health care services** by **clinicians** who are **accountable** for addressing a large **majority of personal healthcare needs**, developing a **sustained partnership** with **patients** and practicing in the **context of family and community**.*

The seven Joint Principles are well-aligned with this definition, but also emphasize the role of the physician, the importance of team-based care, the need for greater coordination across the continuum and the need for new payments to support this broad scope of primary care. The Joint Principles, as summarized in the original document are as follows: 1) Personal Physician, 2) Physician-Directed Team Care, 3) Whole Person Orientation, 4) Care is coordinated and/or integrated, 5) Quality and Safety, 6) Enhanced Access and 7) New forms of Payment (*Joint Principles of the Patient-Centered Medical Home*, 2007).

There is a significant body of literature that attempts to evaluate the impact of this emerging model of care, yet there continue to be significant knowledge gaps (Dy, Apostol, Martinez, & Aslakson, 2013; Jackson et al., 2013; D. Peikes et al., 2012; Sinaiko et al., 2017; Stelfox, Dipnarine, & Stopka, 2013; Williams et al., 2012). Scholars frequently cite the complexity of the Medical Home model and the heterogeneous nature of the practices seeking to adopt this model in varying contexts and circumstances as impediments to gaining greater clarity around its impact. One of the limitations of the many published Medical Home studies is that most studies place practices in broad buckets (Medical Home vs. non-Medical Home) to understand the impact of this new primary care model in a cross-sectional comparison or longitudinal context (Dale et al., 2016; David, Gunnarsson, Saynisch, Chawla, & Nigam, 2015; Fillmore, DuBard, Ritter, & Jackson, 2014; Friedberg, Schneider, Rosenthal, Volpp, & Werner, 2014; Higgins, Chawla, Colombo, Snyder, & Nigam, 2014; Jones et al., 2016; Rosenthal, Sinaiko, Eastman, Chapman, & Partridge, 2015; Wang, Chawla, Colombo, Snyder, & Nigam, 2014). While this research design allows for comparisons between the two groups, they are often

not able to identify a causal relationship or the specific mechanisms in place within the respective practice settings that are contributing to observed outcomes.

This study seeks to close a key knowledge gap through a greater understanding of the ways in which adoption of the Medical Home model changes the delivery of healthcare services, i.e. physician practice patterns. Most importantly, this study seeks to not only ascertain the differences in practice patterns between Medical Homes and non-Medical Homes, but to also identify the ways in which physician behavior is contributing to those observed changes by examining practice patterns at the physician level. To answer these questions, I used provider and practice demographic information along with administrative claims data from a commercial health plan and applied a validated approach to identify services delivered to members associated with high quality, accountable primary care. Differences were compared at the physician level across Medical and non-Medical Home practices.

The commercial health plan is Blue Cross and Blue Shield of Kansas City (Blue KC) which has had a Medical Home program in place since 2010. At the end of 2015, the period from which this study data is derived, there were more than 600 primary care physicians in 124 practices participating in Blue KC's Medical Home program. The measurement approach to understanding the value derived from the primary care delivery model is the Value Index Score (VIS) which is a proprietary methodology developed by 3MTM. It was created for the express purpose of understanding the ways in which primary care contributes to the achievement of value in healthcare (Porter, 2010).

Hypothesis

This study hypothesizes that physicians working in a Medical Home practice setting are delivering care in a manner more consistent with high quality primary care than physicians

working in non-Medical Home practice settings. This is demonstrated through higher scores as measured by the 3M™ Value Index Score (VIS) methodology.

Study Design and Data Sources

This is a cross-sectional, retrospective study that uses provider demographic information and VIS scores calculated at the physician level. The provider demographic information was provided through a Data Use Agreement with Blue KC. The VIS data was provided through an agreement between Blue KC and 3M Treo Solutions (now 3M Health Information Systems). The VIS scores are derived from administrative claims data for Blue KC members attributed to both Medical Home and non-Medical Home primary care physicians during calendar year 2015.

Value Index Scores (VIS)

The aim of the VIS methodology is to measure whether care is delivered to patients in ways that are consistent with the ideals of the Medical Home and the aspirations of the Institute for Health Improvement's "Triple Aim" for U.S. healthcare - better care for patients, improved population health and lower per capita healthcare spending (Berwick et al., 2008)

The VIS methodology includes widely utilized process measures upon which the healthcare industry has become heavily reliant through the Health Effectiveness Data Information Set (HEDIS) used to evaluate health plan performance. The VIS methodology measures utilization of "potentially preventable" high-cost services by comparing actual usage to an expected rate of usage for patients with conditions that when well managed should not require hospital admissions or emergency department services (Fuller, Clinton, Goldfield, & Kelly, 2010). However, it also attempts to move beyond these basic process measures to define and measure broader practice patterns that are widely believed to be aligned with high quality, accountable primary care, such as an ongoing relationship between provider and patient, the

avoidance of unnecessary healthcare services, proactive follow-up, and outreach for chronic patients or for any patient following a significant healthcare event (i.e. hospitalization) as well as improvements in overall health status.

The VIS methodology is widely used in practice by health plans and state Medicaid agencies to evaluate physician performance in alternative payment models such as accountable care organizations and pay-for-performance quality programs in addition to a number of Medical Home programs (*Case Study: Wheaton Franciscan Healthcare-Iowa and Wallmark Blue Cross and Blue Shield of Iowa*, 2015; "The next evolution in healthcare value measurement: 3MSM Value Index Score," 2015). VIS meets the threshold of reliability set by the American Medical Association (AMA) to be used as a composite measure for physician profiling purposes with a correlation of .71 from year-to-year compared to the AMA's established target of .70 (Elston, Sieck, Sullivan, Behal, & Kaleba, 2008; Ruffner, 2011)

Provider and Member Demographic Information

The provider and member demographic information provided by Blue KC includes key information used to describe and augment the physician-level results obtained through this study. The VIS scores are calculated at the physician level while the achievement of Patient-Centered Medical Home recognition by NCQA and participation in Blue KC's Medical Home program is determined at the practice level. The practice location was used to construct a variable that identified whether the practice is in an urban setting, defined as the five counties comprising the Greater Kansas City metropolitan area (Johnson and Wyandotte counties in Kansas and Clay, Platte, and Jackson counties in Missouri). The physician's age, gender and specialty were also included in the model. The primary care specialties provided in the Blue KC provider demographic file and included in the study are Family Practice, Internal Medicine, Pediatrics,

Geriatrics, and a small number of physicians categorized as General Practice, a carry-over from this decades-old provider designation.

The member demographic data provided by Blue KC and used in this study include age, gender, and risk adjustment measures. The risk adjustment measure included in the Blue KC data is Clinical Risk Groups (CRG), a proprietary risk-adjustment methodology developed by 3M™ Health Information Systems to classify the risk-level of its individual members (*3M Clinical Risk Groups: Measuring Risk, Managing Care*, 2011). The CRG methodology relies on medical and pharmacy claims data that can be linked to a unique individual over time. The specific data elements that are used in this process include the following:

- Principal diagnosis coded in ICD-9-CM
- Secondary diagnoses coded in ICD-9-CM
- Procedures coded in ICD-9-CM
- Age
- Sex
- Zip Code

The CRG methodology develops an individual risk score that is calculated monthly for each member based on the most recent twelve months of claims. The monthly CRG risk scores were used to calculate a mean CRG risk score at the individual level for the time frame during which the member was enrolled during the twelve-month study period.

Dependent Variables

Physician VIS scores serve as the dependent variables in this study. The scores included in this study are an overall VIS score which is a composite of the six domain scores summarized in Figure 1 below. The scores indicate the degree to which the services received by the physician's attributed members are consistent with first contact, continuous, coordinated and comprehensive primary care (B. Starfield, Leiyu Shi, & James Macinko, 2005b). All scores are

calculated at the individual physician level and expressed as a percent of completion or the percent difference between actual and expected with a higher score consistent with higher conformity with high quality primary care. Expected values for Potentially Preventable Admissions and Emergency Department (ED) Visits are identified using 3M™ Population Health grouping software that relies on the diagnosis codes and services found in claims data to identify admissions and ED visits for conditions that do not require these services when well managed in an ambulatory setting. 3M™ defines potentially preventable admissions and ED visits as those “that may have resulted from the lack of adequate access to care or ambulatory care coordination” (Goldfield, Kelly, & Patel, 2014). The algorithm considers confounding influences such as mental health/substance abuse diagnoses and extreme age outliers.

Figure 1: Value Index Score Domain descriptions

Domain	Description	Measures	Metric
Primary and Secondary Prevention	Evaluates degree to which provider meets expectations for screen services designed for early detection	Breast Cancer Screening Colorectal Screening Well Child Visits for Infants – 6 years of age	Measures percent completion using HEDIS framework (cancer screenings) and # of well child visits
Tertiary Prevention	Evaluates the effectiveness of provider in addressing “sick care”	Potentially Preventable Admissions (3M™) Potentially Preventable ED Visits (3M™)	Measures percent difference between actual and expected
Panel Health Status Change	Evaluates how well the provider controls the escalation of chronic illness in his/her patient panel over a two-year period	“Status Jumpers” between Chronic Complexity and Chronic Severity classifications	Measures the percent difference between actual and expected
Continuity	Evaluates the level of ongoing engagement the attributed member has with a qualified provider with emphasis on the attributed provider	PCP Visit Qualified Provider Visit Continuity of Care Index* (COC)	Measures percent completion for PCP and Qualified Provider Visits and percent difference between actual and expected for COC
Chronic and Follow-Up Care	Evaluates the provider’s post-hospital care and engagement with attributed members who have chronic conditions	PPR Rates are defined as the # of PPR chains divided by the number of candidate admissions)	Measures the difference between actual and expected
Efficiency	Evaluates the provider’s use of two key healthcare resources – pharmaceuticals and ancillary services	Generic Prescribing Rate Ancillary Services	Measures the percent difference between actual and expected

* COC=
$$\frac{\sum (\# \text{ of visits to each distinct provider})^2 - (\text{total visits})}{(\text{total visits}) \times (\text{total visits}-1)}$$

Independent Variables

The primary predictor variable in this study was the Medical Home status of the physician's practice. Other independent variables in this study are the number of Blue KC attributed members at the physician level to proxy for the importance of Blue KC incentives in practice decisions, the health status of the physician's attributed member population as reflected in the member's mean CRG risk score over the twelve-month study period to account for different risk profiles across providers, the geographic setting of the physician's practice (urban or non-urban) as the cost and availability of practice resources might differ in outlying areas and person-level age and gender characteristics for physicians and members to capture cohort and gender-related differences in provider preferences.

The physician's practice affiliation as of the end of the study period in December 2015 was used to place physicians in the "Medical Home" or "non-Medical Home" groups. The practice-level Medical Home status was taken from the Blue KC provider demographic file and the VIS data file. A small number of physicians had a conflicting Medical Home status in these two files and were excluded from the study. This indicates that a physician was practicing at more than one location during the study period and the practices had a conflicting Medical Home status. The Medical Home designation is earned at the practice level and as physicians change practices, they may lose or gain their affiliation with the Medical Home by changing practice sites. While there are many Medical Home mechanisms in place that transcend the individual physician, the role of the physician in directing patient care will always play a role in the timing and type of services patients receive.

Study Methods

Histograms and box plots were created to visualize the distribution of VIS scores across all physicians and by Medical Home categorization. Next, descriptive statistics were performed to examine differences in member and physician characteristics by Medical Home status. Included in these descriptive analyses are age, percent female and risk score at the member level as well as age, percent female, number of Blue KC attributed members and geographic practice setting (urban or non-urban) at the physician level. Differences in means across Medical Home and non-Medical Home practices was evaluated using t-tests and Chi-Squared statistics.

Differences in Value Index Scores were compared across Medical Home and non-Medical Home practices using t-tests. Next, linear regression analyses were performed to assess the relationships between Medical Home status and VIS scores to understand whether the Medical Home practice setting was associated with high quality primary care practice patterns. Regressions were first conducted for each VIS score with Medical Home status as the sole predictor variable to understand the influence of Medical Home status independent of other factors. Finally, additional predictor variables were included in multiple linear regression models for each VIS score. The multivariate equation was as follows:

$$VIS_{SCORE} = b_0 + b_1 * MHSTATUS + b_3 * CRG + b_4 * URBAN + b_5 * MEMAGE + b_6 * MEMFEMALE + \epsilon_i$$

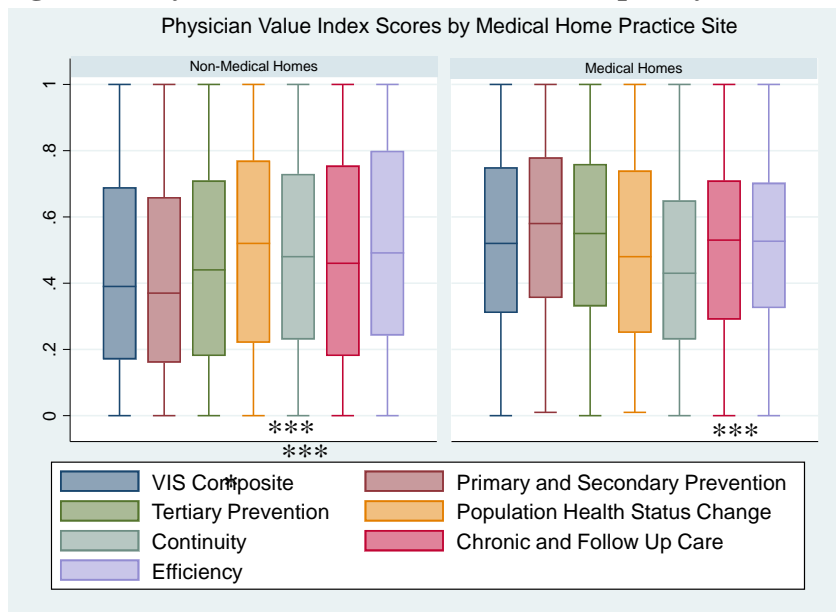
where VIS_{SCORE} is the score for the overall VIS composite measure and the six domains of primary care (Primary and Secondary Prevention, Tertiary Prevention, Panel Health Status Change, Continuity, Chronic and Follow-Up Care and Efficiency) and b_0 represents the VIS scores when all predictors have a value of zero. $MHSTATUS$ is a dichotomous indicator of whether the practice in which the physician delivered care to Blue KC members during the study period was participating in the Blue KC Medical Home program. $MEMBERCOUNT$ is the mean number of members attributed at the practice level during the study period. CRG is the mean risk

score for the members assigned to each physician during the study period and is included to control for differences in the health status of members attributed to physicians. URBAN is a dichotomous indicator of whether the physician’s practice is located within the five-county Kansas City metropolitan area. MEMAGE and MEMFEMALE are included as control variables to account for differences in the age and sex of the member populations attributed to physicians. All analyses were performed using STATA/SE 15.0 for Windows (StataCorp, LLC 2017). A p-value of <0.05 was used to determine statistical significance.

Results

Figure 1 shows the Value Index Scores calculated at the individual physician level and grouped according to Medical Home practice status. This comparison highlights that the physician scores are generally higher and demonstrate less variation among physicians in Medical Home practices as the VIS scores are more tightly distributed around the mean for Medical Home physicians.

Figure 1: Physician Value Index Scores Grouped by Medical Home Practice Status



*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

Histograms for each of the Value Index Scores are included in the Appendix to this paper. When all physicians are grouped together, the scores are evenly distributed. When separated by practice site, the Medical Home physicians' scores are more normally distributed for most domains. Distributions differ for the non-Medical Home physicians and tend to be skewed to the left or have more mass at the extreme values (i.e. zero and one). These visualizations suggest that the Medical Home practice setting is favorably influencing physician practice patterns.

Differences in member and physician characteristics are provided in Table 1 for Medical Home and non-Medical Home practices. The distribution of physicians across Medical Home and non-Medical Home practices was relatively even with 52 percent (n=677) of physicians in a non-Medical Home practice setting and 48 percent (n=631) working in a Medical Home practice. The distribution of members was weighted heavily in favor of the Medical Home physicians with a mean of 245 attributed members per physician compared to just 100 attributed members per non-Medical Home physicians. ($p < 0.001$). The average age and gender distribution varied slightly based on the Medical Home status of the physicians with members attributed to non-Medical Homes slightly younger ($p < .05$) and less female ($p < .05$). The members attributed to non-Medical Homes had a higher CRG risk score of 1.91 compared to 1.72 ($p > .05$). Medical Home practices were much more likely to be in an urban setting ($p < .001$) and differed in primary care specialty with more Medical Home physicians categorized as Internal Medicine and significantly fewer Pediatricians and General Practice physicians ($p < .001$). At 33 percent female, there were slightly more female Medical Home physicians ($p < .05$) and no meaningful difference in the average age for Medical Home and non-Medical Home physicians ($p > .05$).

Table 1: Differences in Member and Physician Characteristics by Medical Home Status

	All	Non-Medical Home mean (95% CI)	Medical Home mean (95% CI)	<i>p</i> -value
Member Characteristics (n)	(222,565)	(67,970)	(154,595)	
Mean Member CRG Risk Score	1.82	1.92 (1.70-2.14)	1.71 (1.50-1.93)	.1836
Mean Member Age	46	45 (44.9-45.8)	46 (45.9-46.7)	.0027*
Percent Female Members	55%	53% (51.4-54.8)	56% (54.6-57.7)	.0101*
Physician Characteristics (n)	(1,308)	(677)	(631)	
Mean Attributed Members	170	100 (90.2-110.5)	245 (229.7-260.0)	.0000**
Percent Providers Urban	65%	52% (48.5-56.1)	78% (75.1-81.5)	.0000**
Specialty:				
- Family Practice	819	417 (61.6%)	402 (63.7%)	.0000**
- Internal Medicine	365	166 (24.5%)	166 (31.5%)	
- Pediatrics	95	70 (10.3%)	25 (4.0%)	
- Geriatrics	3	1 (0.1%)	2 (0.3%)	
- General Practice	26	23 (3.4%)	3 (0.5%)	
Mean Provider Age	50	51 (50.1-52.2)	50 (48.8-50.6)	.0399*
Percent Female Providers	32%	31% (27.5-34.5)	33% (29.3-36.6)	.4515

** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

Notes:

¹Difference in means across Medical Home practice status evaluated using t test; difference in categorical distribution tested using Chi-squared test.

²The sample size for physician age is different due to missing observations; Medical Home n = 532, Non-Medical Home n = 556.

The differences in Value Index Scores by Medical Home status were evaluated using t-tests and are summarized in Table 2. Physicians in Medical Home practices had a mean VIS composite score of 52.1 percent which was .085 points higher than physicians in non-Medical Homes at 43.6 percent ($p < .001$). Medical Home physicians had a mean score of 53.6 percent for Tertiary Prevention compared to 45.4 percent for non-Medical Home physicians ($p < .001$). The Medical Home mean score of 56.3 percent is .142 higher for Primary and Secondary Prevention compared to non-Medical Home physicians at 42.1 percent ($p < .001$). Slightly higher scores were also found for Medical Home Physicians in the domains of Chronic and Follow-Up Care with a mean of 50.5 percent compared to 46.9 percent ($P < .05$) and Efficiency with a mean of 51.4%

compared to 50.5 percent ($p>.05$) The only domains in which non-Medical Home practices outperformed by a small margin were Population Health Status Change with non-Medical Home physicians at a mean score of 50.4 percent compared to 49.4 percent ($p>.05$) for Medical Home physicians and Continuity at a mean score of 48.5 percent for non-Medical Home physicians compared to 44.6 percent for Medical Home physicians ($p>.05$).

Table 2: Comparison of Value Index Scores by Medical Home Status

	All	Non-Medical Home ¹ mean (95% CI)	Medical Home mean (95% CI)	<i>p</i> -value
Value Index Score - Composite	.484	.436 (.408-.463)	.521 (.499-.542)	.0000***
Tertiary Prevention	.498	.454 (.430-.479)	.539 (.519-.559)	.0000***
Primary and Secondary Prevention	.500	.421 (.395-.449)	.563 (.541-.585)	.0000***
Population Health Status Change	.497	.504 (.467-.541)	.494 (.468-.520)	.6837
Continuity	.465	.485 (.461-.509)	.446 (.425-.467)	.9920
Chronic and Follow-Up Care	.489	.469 (.441-.497)	.505 (.483-.526)	.0208*
Efficiency	.510	.506 (.483-.530)	.514 (.495-.532)	.3169

*** $p<0.0001$, ** $p<0.001$, * $p<0.05$, + $p<0.10$ (approaching significance)

Bivariate regressions using Medical Home status as the sole predictor variable of the VIS scores were calculated to understand whether there was a relationship between Medical Home status and primary care practice patterns as measured by the VIS score. The results are summarized in Table 3. These analyses revealed a positive relationship between Medical Home Status for the VIS Composite Score ($p<.0001$) and the domains of Tertiary Prevention ($p<0001$), Primary and Secondary Prevention ($p<.0001$) and to a lesser degree in the domains of Chronic and Follow-Up Care ($p<.05$) and Efficiency ($p>.05$). Negative associations between Medical Home status and VIS scores were found in the domains of Population Health Status Change ($p>.05$) and Continuity ($p<.05$).

Table 3: Bivariate Analyses of Value Index Scores and Physician Medical Home Status^{1,2}

Dependent Variables = VIS Scores	Constant	<i>b</i>	(95% CI)	F
VIS Composite Score	.436	.085 ***	(.050-.120)	F(1,1014) = 22.21
Tertiary Prevention	.454	.085 ***	(.053-.116)	F(1,118) = 27.83
Primary and Secondary Prevention	.422	.141 ***	(.107-.175)	F(1,1036) = 65.86
Population Health Status Change	.504	-.011	(-.054-.033)	F(1,716) = .23
Continuity	.485	-.038 **	(-.07--.007)	F(1,1189) = 5.82
Chronic and Follow-Up Care	.469	.036 *	(.001-.070)	F(1,1055) = 4.16
Efficiency	.506	.007	(-.023 - .037)	F(1,1306) = .23

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

¹Standard Errors clustered at the practice level

² Sample sizes differ by regression due to missing values and range from 718 to 1,308.

Multiple linear regressions were calculated to understand what other factors are associated with higher or lower VIS scores that may be influencing the estimates on Medical Home status. Including additional variables that may be associated with physician or patient behavior provides additional insights into the level of influence Medical Home transformation is playing. Added to the Medical Home model are the practice's geographic location, the member's CRG score, the mean member age and the percentage of female patients within the physician's panel. The geography of the practice accounts for the potential lack of resource availability in less urban areas. The CRG score and member age account for differences in the health status of the patient panels across providers. The percentage of female patients serves as a proxy for gender-specific differences in patient preferences or behaviors. Significant regression equations were found for the VIS Composite Score and all domains except Efficiency. For the VIS Composite Score:

$$(F(5,1010) = 10.89, p < 0.0001) \text{ with an Adjusted } R^2 \text{ of } .0465.$$

Physicians' predicted VIS Composite Score was equal to:

053 + .058 MHSTATUS - .001 CRG + .068 URBAN + .006 MEMAGE + .128 MEMFEMALE
where non-Medical Homes = 0 and Medical Homes = 1, the CRG Risk scores was measured on a numeric scale, non-Urban = 0 and Urban = 1, Member Age was measured in years, and the Percent Female was the number of females divided by the total number of members.

Being in a Medical Home practice, an urban location, the average age of the attributed members and the percent of patients that are female were all significant predictors of the VIS composite score. The percent of female members had the largest impact with a coefficient of .128 ($p<.05$) followed by an urban practice setting with a coefficient of .068 ($p<0.0001$) and being a Medical Home with a coefficient of .058 ($p<.05$).

Overall, the results from the multiple regression equations suggest that there are other factors, in addition to the Medical Home, that are associated with changes in primary care physician practice patterns as measured by the VIS scores. The size and significance of the coefficients for the percent of female patients and having an urban practice location suggest that patient behavior and the availability of local resources may be influential factors that should be considered. The domain score least influenced by other factors was Tertiary Prevention. In this domain, the coefficient associated with Medical Home status was positively associated with Tertiary Prevention ($p<.0001$) with a similar coefficient of .085 compared to .083 in the bivariate regression. Medical Home status was also associated with the Composite Score ($p<.05$) and Primary and Secondary Prevention ($p<.0001$) as found in the bivariate analysis, but to lesser degrees in each instance. The percent of female members was also positively associated with these domain scores, as well as in the Continuity domain. The results for all multiple regression equations are summarized in Table 4.

Table 4: Multivariate Analyses of Value Index Scores by Medical Home Status^{1,2}
(0=Non-Medical Home; 1 = Medical Home)

	Adjusted R-Squared	Medical Home Status (b, 95% CI)	Member CRG Score (b, 95% CI)	Member Age (b, 95% CI)	Percent Female Members	Percent Urban Providers (b, 95% CI)
VIS Composite F(5,1010)=10.89	.0465***	.058* (.021-.094)	-0.001 (-.007-.006)	.006*** (.002-.009)	.128* (.040-.215)	.068*** (.030-.107)
Tertiary Prevention F(5,1032) = 17.37	.0256***	.083*** (.050-.117)	-0.003 (-.009-.002)	-0.002 (-.005-.001)	.074+ (-.003-.152)	0.006 (-.028-.040)
Primary and Secondary Prevention F(5,1,184) = 7.24	.0731***	.117*** (.082-.153)	-0.001 (-.009-.005)	0.002 (-.001-.005)	.098* (.014-.183)	.069*** (.032-.107)
Population Health Status Change F(5,712) = 3.4	.0165*	-0.014 (-.060-.031)	-.075*** (-.112-.037)	.006* (.001-.011)	0.07 (-.046-.186)	-0.002 (-.051-.046)
Continuity F(5,1,184) = 3.82	.0117*	-.054** (-.087-.021)	.002 (-.004-.008)	.000 (-.003-.003)	.102* (.024-.178)	.044* (.009-.078)
Chronic and Follow-Up Care F(5,1051) = 10.07	.0412***	0.01 (-.025-.046)	0.005 (-.002-.012)	.010*** (.007-.130)	0.048 (-.037-.133)	.056* (.019-.094)
Efficiency F(5,1,302) = 1.84	0.007	.001 (-.030-.032)	-.001 (-.006-.004)	.004* (.001-.006)	.038 (-.031-.108)	.006 (-.027-.038)

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

¹ Standard errors clustered at the practice level.

² Physician sample sizes differ by regression due to missing values and range from 718 to 1,308.

Discussion

The purpose of this study was to better understand whether the Medical Home model of care was associated with changes in physician-level practice patterns in a manner consistent with high quality, accountable primary care. While the results are somewhat mixed, the overall findings support the general hypothesis that the Medical Home model of care is favorably associated with the delivery of high quality primary care delivered by physicians in Medical Home settings. Physicians practicing in Medical Homes had an average VIS Composite score of .521 which is 20 percent higher than the .436 average for physicians in non-Medical Home practices. Practicing in a Medical Home was a significant predictor in the multiple regression equation as noted above, but there are also other influential factors that are important to consider.

In addition to having a higher VIS composite score indicating overall practice patterns indicative of high quality primary care, there are two specific domains in which physicians practicing in Medical Homes have significantly higher scores – Primary and Secondary

Prevention and Tertiary Prevention. The Primary and Secondary Prevention score evaluates the degree to which providers meet expectations for screening services designed for early detection. Specifically, this measure uses the HEDIS framework for Breast Cancer and Colorectal Screenings. Medical Home physicians outscored non-Medical Home physicians by more than 33 percent in the VIS Prevention domain. Being in a Medical Home was a significant predictor within this domain, $\beta = .117$, $t(1,032) = 6.47$, $p < .0001$ along with being in an Urban location, $\beta = .069$, $t(1,032) = 3.61$, $p < .0001$ and the percent of female members, $\beta = .098$, $t(1,032) = 2.28$, $p < .05$. The Tertiary Prevention measure seeks to evaluate how well providers manage “sick care” by looking at the difference between the actual and expected “Potentially Preventable” (3MTM) Admissions and ED Visits. In this domain, Medical Home practices outscored non-Medical Home practices by more than 18 percent. In the multiple regression equation, being a Medical Home was the only significant predictor, $\beta = .083$, $t(1,183) = 4.91$, $p < .0001$.

It would be reasonable to credit this better performance to the Medical Home model itself as this is consistent with other studies (Jabbarpour et al., 2017). However, it is also important to note that high screening and immunization rates were important components of the Blue KC Medical Home quality evaluation program for the period in which this study was conducted. Strong performance in these measures led to greater financial rewards for participating Medical Home practices under the Blue KC program. The important question this invites is to what extent are these results attributable to the Medical Home model verses the underlying financial incentives? There is ample evidence to support that provider behavior and practice structures are highly aligned with the financial incentives presented to them (Afendulis et al., 2017; Averill et al., 2010; Berenson & Rice, 2015; O’Kane, 2007). In other words, would we see this difference in performance without the financial incentives in place? We cannot know the answer to that

question based on this study alone. However, this study's findings suggest that Medical Home performance should always take into consideration any financial incentives in place. There are ample concerns expressed in the literature today that the Medical Home model, while an admirable pursuit, is doomed to fail if not properly funded and supported by payers and purchasers of healthcare – in both monetary and non-monetary ways (Barr, 2010; Bujold, 2017; Goroll, 2011; Patel et al., 2012). Discussing Medical Home performance without understanding the underlying financial incentives in place may lead to false conclusions.

Continuity was the only domain in which being in a Medical Home practice setting was negatively associated with the VIS score in the multiple regression model, $\beta = -.054$, $t(1,183) = -3.23$, $p < .001$. Being in an urban practice location, $\beta = .043$, $t(1,183) = 2.5$, $p < .05$ and the percentage of female patients, $\beta = .102$, $t(1,183) = 2.58$, $p < .05$ were the only other significant predictors in this domain. This measure evaluates the level of ongoing engagement between the member and their attributed provider. A potential shortcoming in this domain measure as applied to the Medical Home is that the Medical Home is a practice level intervention that promotes team-based care. The COC Index that creates the baseline measure for the Continuity domain considers a visit to another provider within the attributed provider's group as a visit to the attributed provider. However, the measure does not currently count visits to Nurse Practitioners or Physician Assistants unless they are billed under the Physician. It is possible that the Medical Home practices have more non-physician providers in these categories and their exclusion could be contributing to a lower score for Medical Home physicians.

There are a variety of other factors that can influence this domain. It is important to note that most Blue KC members (~75 percent) are enrolled in a PPO benefit design which provides a broad range of "in-network" provider options and the freedom to move unencumbered from one

provider to another when seeking healthcare services. Maintaining a continuous patient relationship is not facilitated by this type of benefit structure, and one could argue that it is somewhat hampered.

The only other domain in which there was no association with Medical Home status was Population Health Status Change. The Population Health Status Change domain evaluates whether the provider positively influences a change in the health status of attributed members over a two-year period. Not surprisingly, as the member's CRG risk score increased, the Health Status Change domain score for the provider decreased by more than 15 percentage points. Understanding more about the patients in this study would be a useful next step toward interpreting this potential relationship. It is well documented that in the U.S., an individual's health status is more dependent upon other factors, including a patient's socio-economic situation, than on access to healthcare services (Billieux et al., 2017; Dubay & Lebrun, 2012).

The generally low R^2 values along with the number of other variables in the multiple regression model that produced statistically significant associations with VIS scores suggests the need to look beyond the Medical Home model for additional insights into factors that may influence the primary care services received by patients.

Limitations

This study has limitations that should be noted. First, its reliance on administrative claims data introduces potential error which is embedded in the data itself. Claims data exist as an artifact of the provider payment mechanism (fee-for-service) and is not stored or aggregated with any other purpose in mind. Errors in payment or record-keeping can impact the accuracy of the data. Secondly, the provider demographic data obtained from the commercial health plan are subject to the same limitations in that its primary purpose is for accurate representation of

providers in the health plan directory and for payment purposes. Next, the study relied on cross-sectional population data that introduces inherent bias as practices self-selected into the Blue KC Medical Home program. This study does not attempt to evaluate how these practices were different prior to implementation of the Medical Home model so the findings are not causal, but do suggest associations which are worthy of further exploration. Also of note is that the practice in which the physician was working at the end of the study period defined the category to which the physician was assigned. An understanding of how long the physician worked in the Medical Home setting would add to the evaluation of how much the practice setting influences physician practice behavior. An understanding of physician behavior prior to joining a Medical Home practice was not a part of this study nor did this study attempt to answer whether the Medical Home setting itself caused the observed differences between Medical Home and non-Medical Home physician practice patterns.

Conclusion

As we seek new and innovative ways to achieve the Triple Aim goals for healthcare in the U.S., primary care must be central to those efforts. The findings of this study suggest that physicians practicing in Medical Home settings contribute to a more robust primary care foundation by delivering care to patients in ways that are consistent with high quality accountable primary care as defined by the IOM. However, the mixed nature of this study's findings and the generally low R^2 values require us to question what else may be influencing the delivery of primary care in different settings.

Given the level of effort required to achieve the ideals of the Medical Home model of care (Fleming et al., 2017; Kieber-Emmons & Miller, 2017; Paul A. Nutting et al., 2011; P. A. Nutting et al., 2010) and the scant financial rewards in place to support this model (Ash & Ellis,

2012; Edwards et al., 2014; Sessums et al., 2016), it is wise to exercise caution when making assessments about its success or impact when we know that there are many other influential factors at work. In this study, the geographic location of the practice and the members' age and gender all played meaningful roles along with the Medical Home status of the practice. However, together, these variables did not explain more than eight percent of the variation in VIS scores. Clearly, there is more at work than the factors included in this study.

There are many areas for further consideration and discussion that arise from this study's findings and limitations. There are two that I would like to briefly explore. First, to what degree is the Medical Home practice setting responsible for the differences found in physician practice patterns? Second, to what extent is the lack of more favorable Medical Home scores an indication that there are other factors outside the Medical Home that must be considered?

Regarding the first question, the high degree of variation in VIS scores observed across physicians practicing in non-Medical Homes compared to the more normally distributed VIS scores for physicians practicing in Medical Homes suggests that there is something at work in the Medical Home practice setting that is influencing physician practice patterns. Exploring this further could be accomplished with a qualitative research design to understand the role that practice-level staffing or processes play within specific domains. One might also want to consider more about the physicians or practices themselves, such as the staffing ratio of clinical and/or non-clinical staff to the number of physicians, the length of time the physician has been within the practice, what financial incentives or "pay-for-performance" programs it participates in that might influence how care is delivered, or whether the practice is part of a larger organization, such as a hospital or healthcare system that influences how care is delivered.

In terms of the second question regarding factors outside the primary care practice setting that are of significance, there are many directions one might take, some of which have already been mentioned. Understanding more about the patients' insurance coverage and its requirements could shed light on how well the primary care physician is positioned to influence the delivery of care for individual patients. The degree to which the insurance plan stipulates or incents the use of primary care services over specialty services could influence how individuals access care and move throughout the system. Holding physicians or the Medical Home accountable for patient behaviors over which they have limited to no control creates a no-win situation for primary care that has the potential to act as an unintended deterrent to the hard work required under the Medical Home model.

The significance of the practice's geographic location to many of this study's findings suggests the need to understand how the broader community influences the delivery of care and the health of the population. We must strive to understand more about the patient population and the communities or contexts in which they live if we want to achieve health improvement. Understanding more about the unmet social or economic needs of patients that contributes to poor health status is a potential avenue for further exploration and intervention design.

There are many innovative programs and models in place that highlight the need for primary care to operate as part of the broader community in which it resides (Franz & Murphy, 2017; Loskutova et al., 2016; Miller & Baumgartner, 2016). Finding ways to connect primary care practices with community resources that meet the broader social and economic needs of its patients is essential to fulfillment of the Medical Home ideals and the Triple Aim aspirations for our nation (Friedman et al., 2016; Jones et al., 2016; Valdovinos et al., 2011). Primary care practices must be equipped with the appropriate patient screening tools to assess need and

understand how to best connect their patients with available community resources in a manner that is integrated within the context of a high quality, accountable primary care delivery model ("CPC+ Care Delivery Brief," 2017; Schickedanz & Coker, 2016). Efforts such as CPC+ which brings this issues to the forefront should be encouraged as a way to help primary care practices gain these important skills that are not a part of the traditional medical education model and are more often learned in real-life practice settings. Future research should seek to understand not only the overall impact that these efforts have, but must also describe the ways in which successful integrative models work to support the broad adoption of these approaches if they are going to contribute to the aspirational improvements captured in the Triple Aim.

Ultimately, this is a local community issue. The Network for Regional Healthcare Improvement (NRHI) and its community based collaborative members serve as models and pioneers for these efforts (Mitchell, 2017). It is important to bring all stakeholders to the table – patients, providers, public health, payers, and purchasers (employers and individuals) to join this conversation in meaningful ways across our local communities. Understanding the ways in which primary care and public or community health initiatives can more fully collaborate on behalf of patients with unmet social or economic needs is an important consideration outside of the primary care practice setting that must be considered in any evaluation of primary care itself.

Finally, it is important to remind ourselves that it will take more than a robust primary care model to truly achieve all three aspirations of the Triple Aim. When introducing the Triple Aim goals established by the IHI, Berwick and his co-authors (2008) underscored the complexity of the U.S. healthcare system and called for the role of “integrator” – a single entity that assumes responsibility for fulfilling the Triple Aim goals on behalf of a specific population. One of the suggested roles of the integrator is to support the “redesign of primary care services and

structures” (Berwick et al., 2008). The other roles include involving patients and families, population health management, financial system management and system integration at the macro level.

Berwick, et al. (2008) state that the role of the integrator must be a “single organization” and “not just a market dynamic” suggesting that collaboration and working together, while admirable and a step in the right direction, are not sufficient to reach the aspirations laid out by the Triple Aim. Ten years later, we have begun to build the foundation of a more robust primary care system thanks to the Medical Home movement. However, the question posed by Berwick and his co-authors from 2008 remains relevant today. Who is willing to be the integrator and disrupt “institutions, forms, habits, beliefs, and income streams in the status quo” to achieve the Triple Aims of “better care, smarter spending and healthier people?”

Understanding the Medical Home model and its contribution to an improved primary care infrastructure is just one, albeit important, step in the journey to achievement of the Triple Aim. Further study of the factors outside the primary care practice setting, whether Medical Home or non-Medical Home, will contribute to a greater understanding of how to be position and empower primary care within the context of the broader healthcare system.

Chapter 4: Is Ownership of Medical Home Practices Associated with Differences in Cost and Utilization?

Introduction

The Patient-Centered Medical Home (Medical Home) is an advanced primary care model that has evolved and spread across the US since the creation of the Patient-Centered Primary Care Collaborative (PCPCC) in 2006 and the signing of the “Joint Principles of the Patient-Centered Medical Home” (Joint Principles) by the primary care professional societies in 2007. Over the last ten years, the Medical Home has been defined in a variety of ways. The PCPCC describes it as “a model or philosophy of primary care that is patient-centered, comprehensive, team-based, coordinated, accessible, and focused on quality and safety. (“Medical Home Definition,” 2017). The Agency for Healthcare Research and Quality (AHRQ) defines the Medical Home as “not simply as a place but as a model of the organization of primary care that delivers the core functions of primary health care” (“Defining the PCMH,” 2017). AHRQ identifies the five-core function as 1) Comprehensive Care, 2) Patient-Centered, 3) Coordinated Care, 4) Accessible Services, and 5) Quality and Safety.

Which definition one embraces is not as important as the fact that the Medical Home has created a new framework that places the importance of primary care at the center of the ongoing dialogue about how to best achieve the widely embraced triple-aim healthcare goals espoused by the Institute for Healthcare Improvement (IHI) - to create a better patient experience of care, improve the health of populations and lower the per capita cost of care (Berwick et al., 2008). More recently, the triple aim aspirations have been expanded by some to include a fourth aim – improving the work experience of providers and caregivers – and is sometimes referenced as the “quadruple aim” (Bodenheimer & Sinsky, 2014).

These are lofty expectations placed on the Medical Home and much effort has been dedicated to evaluating its impact toward these aims (Alexander & Bae, 2012; Budgen & Cantiello, 2017; Crabtree et al., 2011; Crabtree et al., 2010; Flottemesch, Fontaine, Asche, & Solberg, 2011; Friedberg et al., 2009; Friedberg et al., 2014; Gilfillan et al., 2010; Gurewich, Cabral, & Sefton, 2016; Henke et al., 2016; Hoff et al., 2012; Kieber-Emmons & Miller, 2017; D. D. Maeng, Sciandra, & Tomcavage, 2016; McAllister, Presler, Turchi, & Antonelli, 2009; McHugh et al., 2016; Paul A. Nutting et al., 2011; Paustian et al., 2014; D. Peikes et al., 2012; Rosenthal et al., 2013; Solberg et al., 2011). Many of these studies compare Medical Home practices to non-Medical Home practices across a variety of outcomes of interest including cost, utilization of high cost services, quality, and patient experience. Many studies also seek to identify specific features or mechanisms associated with better Medical Home outcomes (Alexander et al., 2015; Gimm et al., 2016; A. S. O'Malley, Rich, Maccarone, DesRoches, & Reid, 2015; Diane R. Rittenhouse et al., 2011; Simon et al., 2017).

There is general acknowledgment that the process of shifting primary care from its more episodic, transactional mode in which the office visit is the central commodity to a more comprehensive and coordinated model is a significant undertaking (Paul A. Nutting et al., 2011; P. A. Nutting et al., 2010). The Medical Home model calls on primary care practices to not only transform internal processes, but to change the way they interact across the healthcare system – creating a Medical Home “neighborhood” in which the primary care physician led team is in the driver’s seat (Greenberg, Barnett, Spinks, Dudley, & Frolkis, 2014; Halley, Montijo, Gentz, & Miro, 2015; Pham, 2010). These are major shifts and there are differing views on the best path forward making this shift increasingly complex (Sinsky, 2011; Walker et al., 2013; Yee, 2011).

In a 2008 JAMA commentary, Don Berwick described the introduction of rapid response systems in hospitals as “a complex, multicomponent intervention—essentially a process of social change” (Berwick et al., 2008) . He encouraged researchers to broaden the lens of evaluation to recognize a variety of contextual factors that influence the implementation of these complex healthcare interventions including a broad “array of influences” such as leadership, organizational history, and changing environments. To understand the evolution and impact of the Medical Home, one must consider these types of influences and contextual considerations. Each practice “site” and the way it approaches Medical Home transformation is influenced by many factors including the level of local community resources (rich or scant), the structure of the healthcare market (consolidated or competitive), the mix of payers with whom the practice contracts (what incentives are available and how difficult they are to attain), and the organizational structure/ownership in which the practice operates – as part of a broader system or independently owned by the physicians within the practice (A. S. O'Malley et al., 2015).

Each Medical Home practice site is influenced by the environment in which it operates. and how the key features of primary care are impacted. For example, a well-functioning Health Information Exchange (HIE) that supports the timely transfer of patient information across multiple care providers, regardless of ownership, facilitates the coordination of care efforts of all providers and may influence the way in which a Medical Home approaches this important aspect of primary care. Just as importantly, the absence of a well-functioning HIE places a greater burden on the primary care practice to build capabilities that compensate for the absence of this important community-level resource.

The ownership structure of the practice represents another example of how each Medical Home practice site is influenced by its context. Medical Home evaluations primarily focus on the

practice site as the unit of analysis with little regard for the context in which it operates. This study seeks to contribute to our shared understanding of the complexities of realizing the ideals of the Medical Home model through an examination of how the ownership structure of a Medical Home practice influences key outcomes of interest to policy makers, health plans and private purchasers – the total cost of care and the utilization of high cost services including hospital and ED visits.

There has been a notable shift away from physician-ownership of practices over the last 30 years. (Table 1) The American Medical Association’s Physician Practice Benchmark Survey reported that for the first time in 2016, fewer than half of practicing physicians owned their own practice (C. K. Kane, 2017). The same survey reported that the number of physicians employed in a practice with “at least some hospital ownership” is up from 23.4 percent in 2012 to 25.4 percent in 2016. Also, of note is the shift in the size of physician practices. Most notably, solo practices have decreased from over 40 percent in 1983 to less than 20 percent in 2016 (C. Kane, 2015; C. K. Kane, 2017). While the ownership structure has been shifting, the fact that many physicians continue to work in relatively small practice settings (between two and ten physicians) is unchanged. What this suggests is that hospital or system acquisition of physician practices has not changed the fundamental structure of acquired practices. The relatively small size of the physician practice, and the change in practice ownership are important consideration for policy makers, health plans and private purchasers who wish to support primary care practices striving to achieve the ideals of the Medical Home (Casalino et al., 2013; Gimm et al., 2016; Diane R. Rittenhouse et al., 2011). The most important insight may be the least understood – for what purpose are hospitals and health systems acquiring physician practices.

Table 1: Physician Practice Ownership and Size Trends

Column1	1983	2016
Physician-Owned	76.10%	47.10%
Solo Practice	40.0%	16.5%
<= 10 Physicians	39.6%	44.2%
> 10 Physicians	20.4%	39.3%

Source: American Medical Association’s Physician Practice Benchmark Survey

Historically, hospitals’ desire to increase market share by gaining much needed referrals for admissions, diagnostic testing or other hospital-based services spurred the growth in practice acquisition and physician employment (Kocher & Sahni, 2011; A.S. O’Malley et al., 2011). In more recent years, it has been suggested that as provider payments shift to population based models, forward thinking hospitals and health systems view aligning with primary care as foundational to their future success (Rodriguez et al., 2016).

From the physician perspective, the requirements to implement new technologies and respond to changing provider payment models has created burdens that are taxing to small practices with limited resources which makes ownership or employment in a hospital or health system an attractive alternative. Physicians feeling the burdens of practice ownership combined with hospitals’ and health systems’ appetite to employ physicians, even if it means incurring a loss in the early years, sets the stage for the shift in physician employment status (Halley, 2014a; Halley & Anderson, 2014; Kocher & Sahni, 2011). Also contributing to the shift in physician employment is that younger physicians often prefer an employed arrangement that provides a better work-life balance (Halley, 2014b; A. S. O’Malley & Reschovsky, 2011).

There have been many studies that have examined this shift in ownership to understand its impact on cost and quality of care. The results are somewhat mixed with hospital/system ownership favorably associated with quality improvements and negatively associated with cost

improvements. Some studies suggest that that hospital/system ownership appears to increase the adoption of quality practices (Bishop, Shortell, Ramsay, Copeland, & Casalino, 2016; Friedberg et al., 2009). Many of these processes are essential to fulfilling care delivery expectations as a Medical Home (Wiley et al., 2015). There is also evidence that hospital/system ownership of physician practices is associated with higher cost of care (Baker, Bundorf, & Kessler, 2014; Robinson & Miller, 2014). This is particularly true in cases when there is significant hospital consolidation that results in a less competitive healthcare market (Austin & Baker, 2015; Baker, Bundorf, Royalty, et al., 2014).

The studies that find increased cost associated with hospital or health system acquisition of physician practices suggest that ownership is motivated by a desire to gain market share for lucrative fee-for-service non-primary care services more so than a forward-thinking view of population health as a strategy. However, the evidence that hospital/system owned physician practices have a higher adoption of high quality primary care practices signals that something is changing when this change in ownership occurs. Considering the changes put in place by the Medicare Access and Chip Reauthorization Act of 2015 (MACRA) that place less emphasis on fee-for-service and more on alternative payment models, both may be true in the short term. We may see little to no impact on total cost of care related to physician ownership of primary care practices in the near term, but as larger systems move toward accountable care arrangements involving hospitals and specialists, the enhanced primary care infrastructure they are building is a necessary and important driver of future success.

Hypothesis

This study hypothesizes that hospital/system owned primary care practices participating in Blue Cross and Blue Shield of Kansas City's (Blue KC's) Medical Home program face unique

challenges balancing the desire to implement high quality accountable primary care models with the business objectives of its owner hospitals and health systems. In a market, such as Kansas City, that continues to be dominated by fee-for-service payments, the financial incentives for hospitals and health systems are clearly aligned with driving greater usage of available services. The financial incentives derived from implementing the Medical Home model are insignificant in comparison to the revenue stream that hospitals and health systems derive from non-primary care services. For this reason, I expect hospital/system-owned Medical Home practices to be associated with higher risk-adjusted Total Cost of Care as measured on a PMPM basis and higher than expected Hospital Admissions and Emergency Department (ED) visits when compared to physician owned Medical Home practices. There have been many studies that have examined the association between healthcare cost and hospital/system ownership, but this study is the first of which the author is aware that looks specifically at whether this relationship is observed in the context of a Medical Home program. This is increasingly important as primary care practices that have adopted the Medical Home model are more frequently hospital owned than physician owned (American Medical Association, 2017).

Policy makers and private purchasers are increasingly interested in the total cost of care (TCOC) (Robinson & Miller, 2014; *Total Cost of Care (TCOC) and Total Resource Use White Paper*). This shift is in line with population-based alternative payment models that rely on physician accountability for all healthcare costs associated with defined populations (Robinson, Williams, & Yanagihara, 2009).

Study Design and Data Sources

This is a cross-sectional, retrospective study that uses member level claims data, member and provider demographic information, Blue KC Medical Home scores and the type of practice ownership to understand whether Medical Home practices that are hospital/system owned are associated with higher cost and utilization of high cost services. The member and provider demographic information, TCOC data and Medical Home Scores were provided through a Data Use Agreement with Blue KC.

The achievement of Patient-Centered Medical Home recognition by NCQA and participation in Blue KC's Medical Home program is determined at the practice level which is this study's unit of analysis. At the time of this study, practices participating in the Blue KC Medical Home program were required to achieve Level II or III Patient-Centered Medical Home recognition through the National Committee for Quality Assurance (NCQA) and agree to the terms of the program.

Member Cost and Utilization Data

Blue KC provided previously calculated Total Cost of Care (TCOC) Per Member Per Month (PMPM) for dates of service occurring during the 2015 calendar year that were paid by March 31, 2016 (90-day run out period). The TCOC PMPM amounts represent allowed charges which includes payments to the providers made by the health plan and member responsibility in the form of copays, deductibles, or coinsurance. TCOC PMPM amounts were risk-adjusted using 3MTM's proprietary methodology, Clinical Risk Groups (CRG's). Allowed amounts that exceeded \$75,000 for an individual member during a twelve-month period were excluded to align with the stop loss level specified in the Medical Home program. To evaluate utilization of hospital admissions and ED visits, Blue KC provided previously calculated actual and expected

rates of hospital admissions and ED visits for dates of service in calendar year 2015 (including same 90-day run out period used to calculate the TCOC PPM).

Provider and Member Demographic Information

The provider and member demographic information provided by Blue KC includes attributes used to categorize and describe practice-level results. Primary care specialties included in Blue KC's program are Family Practice, Internal Medicine, Pediatrics, Geriatrics, and General Practice. Practices were categorized according to whether they were participating in Blue KC's Medical Home program at the time of this study. Blue KC provided the ownership status of each Medical Home practice as a supplement to the physician demographic file.

The physician demographic information was aggregated at the practice level. The practice characteristics included in this study include the number of physicians per practice site, the number of attributed member per practice and per physician, the mean CRG risk score, the average age and percentage of female members attributed to the practice, and whether the practice is in an urban location. The practice location was used to construct a variable that identified whether the practice is categorized as urban, defined as the five counties comprising the Greater Kansas City metropolitan area in this study. These counties include Johnson and Wyandotte counties in Kansas and Clay, Platte, and Jackson counties in Missouri. The physician's age and gender were also included in the analysis.

Practice populations were developed based on Blue KC's member attribution process that occurs monthly. Members are attributed to eligible primary care physicians based on a plurality of eligible claims (E&M codes for office-based visits) observed in the most recent 12-month period. In the event no eligible claims are found, Blue KC will scan the previous 12-month

period. In the event of a tie, the member is attributed to the provider with the most recent date of service. If no claims are found, the member is “unattributed.”

The member demographic data provided by Blue KC for use in this study include age, gender, and risk adjustment scores. Clinical Risk Groups (CRG), a proprietary risk-adjustment methodology developed by 3M™ Health Information Systems, is the risk-adjustment methodology used by Blue KC (*3M Clinical Risk Groups: Measuring Risk, Managing Care*, 2011). It relies on the diagnostic and procedural information derived from medical and pharmacy claims data in addition to specific member attributes such as age, gender, and zip code to compute a CRG risk score that is updated monthly. The mean CRG risk score for each member throughout calendar year 2015 was aggregated at the practice level for use in this study.

Medical Home Scores

This study includes a Medical Home Score assigned by Blue KC at the end of 2014 to each Medical Home entity. This score reflects the degree of implementation of key Medical Home processes which is why it is included as a predictor variable. To generate this score; the Blue KC Medical Home team assesses physical documentation and conducts practice interviews to score Medical Home practices. An overall percentage score representative of the Medical Home’s performance is calculated across the following domains of high quality, accountable primary care delivery:

- Access - Same-day, next available and after-hours availability are all considered
- Care Planning – Huddles and documentation processes
- Patient Engagement – Medical Home education/information shared with patients
- Coordination – Process for care transitions
- Continuity – “No show” and patient call return processes
- Patient Experience – Practice administered survey results

The Medical Home Score is assigned at the ownership level— whether that is a hospital or healthcare system with multiple practice locations or a physician-owned practice group with one or more locations.

Dependent Variables

Three variables representing cost and utilization outcomes that are of broad interest to policy makers and health purchasers are included as the primary dependent variables.

- TCOC PMPM is a risk-adjusted representation of all healthcare paid claims with dates of service during calendar year 2015 and paid within the first 90 days of 2016. All healthcare costs including hospital/facility (inpatient and outpatient), professional, ancillary (labs and diagnostic tests), and pharmaceutical, are included and risk-adjusted based on the CRG risk score assigned to each member.
- Hospital Admits represents the difference in the Actual rate of hospital admissions compared to the Expected rate of admissions based on the health status of the practices' attributed members. The difference is defined as Actual – Expected so a negative value indicates better than expected performance.
- ED Visits represents the difference in the Actual rate of ED visits compares to the Expected rate of admissions based on the health status of the practices' attributed members. Difference is defined as Actual – Expected so a negative value indicates better than expected performance.

Independent Variables

The primary focus of this study is the ownership status of primary care practices participating in Blue KC's Medical Home program. Practices were grouped according to whether they were reported by Blue KC as hospital/system or physician owned. Other practice attributes

of interest included in this study are the number of physicians at each practice location, the number of Blue KC attributed members per physician, the geographic setting of the practice (urban or non-urban), and the Medical Home Score earned as a participant in the Blue KC Medical Home program. The health status of the members attributed to each practice is controlled for using the member's mean CRG risk score over the twelve-month study period aggregated at the practice level. Additional member-level characteristics are included as controls for the influence patient attributes may have on the outcomes of interest including the mean age and the percent of female members attributed to the practice.

Study Methods

Descriptive statistics were performed to examine differences in practice characteristics by comparing hospital/system owned practices to physician owned practices. Included in these descriptive analyses are member and practice attributes described above. Differences in means across hospital/system and physician owned practices were evaluated using t-tests and Chi-Squared statistics. Differences in the three dependent variables of interest, TCOC PMM, Hospital Admits and ED Visits were also evaluated using t-tests.

Next, linear regression analyses were performed to assess relationships between ownership type and TCOC PMM, Hospital Admits, and ED Visits. This step was used as a sensitivity analysis to understand the relationship between hospital/system ownership and the primary outcomes of interest. Bivariate regressions were conducted for each variable of interest with ownership type as the sole predictor variable.

Finally, additional control variables were included in multiple linear regression models for the cost and utilization outcomes of interest. All analyses were performed using STATA/SE

15.0 for Windows (StataCorp, LLC 2017). A p-value of <0.05 was used to determine statistical significance.

Results

Table 1 presents an evaluation of the differences in member and physician characteristics measured at the practice level. There were 107 practices included in this study with 27 (25 percent) owned by physicians and 80 (75 percent) owned by a hospital or health system. The variables of interest in this analysis include Percent Urban, Mean Member Age, Mean Member Count, Percent Female Members, Medical Home Score, and VIS Composite Score. Using t-test and Chi Squared analyses, the only difference between physician and hospital/system owned practices to reach statistical significance was the percent of practices in urban setting ($p<.0001$). All other comparisons revealed very small differences that did not reach statistical significance in this analysis.

Table 1: Differences in Practice-Level Characteristics by Ownership Type

	Physician Owned Practices mean (95% CI)	Hospital/ System Owned Practices mean (95% CI)	Difference
Practice Characteristics (n=107)	27 (25%)	80 (75%)	
Number of Physicians per Practice	4.7 (3.8 to 5.6)	5.5 (4.1 to 6.9)	-.8
Percent Urban	96%	70%	26%*
Number of Attributed Members	1538 (1074 to 2001)	1541 (1103 to 1977)	-3
Number of Members per Physician	330.9 (266.7 to 395.1)	309.2 (272.6 to 345.8)	21.7
CRG Risk Score	1.63 (1.5 to 1.8)	1.86 (1.3 to 2.4)	-.23
Member Age	46.8 (45.6 to 47.9)	46.5 (45.8 to 47.2))	.3
Percent Female Members	54.8% (51.6 to 58.0)	57.1% (55.4 to 58.8)	-2.3%
Medical Home Score	73.6% (69.9 to 77.4)	72.0% (67.7 to 76.4)	-1.6%

*** $p<0.0001$, ** $p<0.001$, * $p<0.05$, + $p<0.10$ (approaching significance)

Notes:

¹Difference in means evaluated using t test; difference in categorical distribution tested using Chi-squared test.

Next, an evaluation of the differences in the outcomes of interest by ownership type was conducted using the t-test statistic that is summarized in Table 2. This analysis revealed statistically significant differences in the TCOC PMPM and the Difference in Hospital Admit Rates, but not in the Difference in ED Visit Rates.

Table 2: Comparison of Outcomes of Interest by Ownership Type

	Physician Owned Practices mean (95% CI)	Hospital/Healthcare System Owned Practices mean (95% CI)	Difference
Total Cost of Care Per Member Per Month	\$338.77 (329.66 to 347.88)	\$359.48 (356.88 to 362.07)	-\$20.71***
Difference in Hospital Admission Rates (Actual – Expected)	-5.7 (-9.7 to -1.65)	.59 (-.63 to 1.8)	-6.3***
Difference in ED Visit Rates (Actual – Expected)	8.3 (1.1 to 15.6)	9.8 (3.8 to 15.8)	-1.5

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

Notes:

¹Difference in outcomes of interest evaluated using t test

Table 3 summarizes the results of the bivariate analyses which were used as a sensitivity analysis for the primary outcome of interests and the Blue KC Medical Home Score, an important covariate using ownership type as the sole predictor variable. The outcomes of interest are Total Cost of Care Per Member Per Month and the Difference in Hospital Admits and ED Visits as measured by the actual rate minus the expected rate. The results of this bivariate analyses revealed a statistically significant relationship between ownership type and the Total Cost of Care and the Difference in Hospital Admits. Ownership type was not found to be a statistically significant predictor of the Difference in ED Visits.

Table 3: Bivariate Analyses of Outcomes of Interest by Medical Home Score

	Constant	<i>b</i> (95% CI)	R-squared	F	<i>p</i> -value
Total Cost of Care (Per Member Per Month)	\$374.48	-27.92 (-46.93 to -8.9)	.0772	F(1,106) = 8.48	.004
Difference in Hospital Admits (Actual – Expected)	-.75	-.34 (-9.2 to 8.5)	.0001	F(1,106) = .01	.940
Difference in ED Visits (Actual – Expected)	43.42	-46.90 (-85.5 to -8.35)	.018	F(1,106) = 5.82	.018

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

Table 4 presents the associations between cost and utilization outcomes and hospital/system ownership after adjusting for the number of Blue KC attributed members per doctor, member characteristics including age and percentage of female members, and the Blue KC Medical Home Score. Other factors were excluded from the multivariate model due to their correlations with the selected variables. For example, all outcomes were risk-adjusted using CRG risk-scores so that influence is already reflected in the outcomes themselves. The number of members per doctor is a function of the number of Blue KC members attributed to each practice and the number of physicians at each practice. Also, the ownership status of the practices was found to be correlated with whether the practice is defined as “urban” in this study.

The results of the multiple regression analysis indicate that the predictors included in the model explained 34 percent of the variance in TCOC PMPM ($R^2=.34$, $F(5,106) = 6.3$, $p < .0001$). Hospital ownership is associated with an increase in TCOC PMPM ($\beta = 20.28$, $p < .0001$) while the Blue KC Medical Home Score is associated with a decrease ($\beta = -24.5$, $p < .05$). The model explained 24 percent of the variance in Hospital Admissions ($R^2=.24$, $F(5,106) = 3.71$, $p < .05$) with Ownership associated with an increase in unexpected admissions ($\beta = 6.32$, $p < .001$) and member age having a small association with fewer than expected admissions ($\beta = -.71$, $p < .05$). The model explains 18 percent of the variance in ED Visits ($R^2=.18$, $F(5,106) = 3.26$, $p < .001$) with ownership exhibiting no significant association to this outcome. In this model, the Blue KC Medical Home Score indicates a large and significant association with few than expected ED Visits ($\beta = -40.5$, $p < .05$) and the number of physicians having a small but favorable impact ($\beta = -.04$, $p < .001$).

The Blue KC Medical Home Score was negatively associated with TCOC PMPM (-24.5, 95% CI -41.6 to -7.4, $p < .05$) and fewer than expected ED Visits (-40.9*, 95% CI -76.9 to -4.9, $p < .05$). There was no statistically significant association detected between the Medical Home Score and hospital admission rates.

Table 4: Multivariate Analyses by Medical Home Practice Ownership Type (0=Independent, 1=Hospital/System)

	Total Cost of Care Per Member Per Month		Difference in Hospital Admits (Actual – Expected)		Difference in ED Visits (Actual – Expected)	
	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>B</i>	(95% CI)
Ownership Type	20.28***	(11.27 to 29.28)	6.32**	(2.7 to 9.9)	-.3	(-7.9 to 7.3)
Members Per Physician	-.01	(-.03 to .01)	-.01	(-.01 to .01)	-.04**	(-.06 to -.01)
Member Age	.19	(-1.1 to 1.5)	-.71*	(-1.4 to -.06)	.13	(-.80 to 1.1)
Percent Female	-5.2	(-48.7 to 38.4)	-13.4	(-30.6 to 3.77)	14.1	(-22.2 to 50.5)
Medical Home Score	-24.5*	(-41.6 to -7.4)	-.38	(-8.2 to 7.5)	-40.9*	(-76.9 to -4.9)
F (5,106)	630***		3.71*		3.26**	
R-Squared	.3378***		.2353***		.1800**	
Constant	353.82		36.85		37.60	

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, + $p < 0.10$ (approaching significance)

Note: Unit of analysis is practice-level means; Sample size is 107 practices with 27 categorized as “Independent” and 87 as “Hospital/System” owned. VIS Composite and Domain Scores, Percent Female Members and Member Count were included in the multivariate analyses, but did not reach significance for any outcome of interest and are excluded from this summary table.

Discussion

Hospital or health system ownership of a Blue KC Medical Home is associated with more than a \$20 increase in TCOC PMPM, approximately six percent more than physician-owned practices. ($p < .0001$) This relationship is also seen in a higher than expected rate of hospital admits ($p < .001$), but no association between ownership and the rate of ED Visits was found. Hospital ownership is associated with 6.32 hospital admissions per year more than expected based on the risk of the attributed population. The expected rate of hospital admissions is ~70 per thousand members per year for both hospital/system and physician owned practices representing almost ten percent more hospital admissions per year for members attributed to Medical Home practices

With a total of 123,200 Blue KC members attributed to hospital/system owned physician practices, an increase of six admissions per thousand members translates to an additional 778 hospital admissions per year. At an average cost of \$10,000 per admission, these additional hospitalizations amount to more than \$7.5 million in annual healthcare cost (McDermott, Elixhauser, & Sun, 2017). The additional \$20 TCOC PMPM for this group of members attributed to hospital/system owned Medical Home practices translates to more than \$29 million in additional healthcare cost per year for this population.

These results confirm the findings from other studies that have identified a relationship between hospital or health system ownership of a physician practice and higher spending as evaluated through specific services or prices (Baker, Bundorf, & Kessler, 2014; Baker, Bundorf, Royalty, et al., 2014). This study also confirms this relationship between hospital ownership of physician practices and the unfavorable impact on the total cost of care in a study conducted across all health care providers for a specific geographic region (Robinson & Miller, 2014).

In theory, health system employment of physicians or ownership of practices should contribute to a more coordinated, patient-centric experience that leads to greater efficiency and lower cost. There is little evidence to support that this is happening. This is of concern given the increasing number of physicians in employed or system-owned practice settings and our collective desire to accelerate achievement of the triple aim aspirations including lowering the cost of care. There are a number of factors in play that may be getting in the way of that reality.

First, there are institutional or systemic barriers that impede coordination and integration in many system settings. Common employment or ownership does not necessarily lead to the kinds of efficiencies one might expect from an integrated care delivery model. The reality of many health systems today is that communication between primary care and other specialties is

limited – even when both are under the same health system. “The lack of communication between outpatient and inpatient physicians is problematic...we know we need to start addressing it.” stated a Phoenix Hospital CMO in an interview conducted as a study of the shift to system employed physician models in 10 sites across the U.S (A.S. O'Malley et al., 2011). In some instances, electronic health records are not always the same across inpatient and outpatient setting within the same system further complicating any cultural or systemic barriers to communication across specialties (A. S. O'Malley & Reschovsky, 2011).

Second, the financial incentives experienced at the physician level are very different when the physician owns the practice – especially under the new alternative payment models. While we are striving to move the needle toward “value over volume” in provider payment models, fee-for-service payment is still the primary driver of healthcare revenue in almost every health care setting today (APM Workgroup, 2016; Zeng et al., 2010). Delivering a higher volume of services or delivering a mix of higher-cost services is explicitly rewarded by fee-for-service payment. Compensation models for employed physicians tend to reinforce these incentives with productivity-based physician compensation arrangements (Khullar, Kocher, Conway, & Rajkumar, 2015; Laugesen, 2014). When systems contract for new alternative payment models, such as a Medical Home program, which includes non-fee-for-service payment mechanisms in the form of shared savings or care coordination fees, systems often continue to compensate physicians under RVU-driven productivity models.

Physician-owned practices gain a competitive advantage in programs like Blue KC’s Medical Home program. How additional infrastructure payments (care coordination or care management fees) and/or shared savings or other incentive payments are spent is within the control of physician owners. This is not the case with system owned or employed physicians. In

the case of the Blue KC Medical Home, one physician lamented that the care coordination fees paid in support of this primary care initiative were being used by one system to “pay for bedside nurses” (“Conversation with Blue KC Medical Home Physician,” 2016). The Comprehensive Primary Care Plus (CPC+) program, an advanced primary care transformation initiative sponsored by CMS has begun to change the conversation around this topic by acknowledging that payments or incentives intended for or earned by primary care practices do not always end up supporting primary care when those practices are hospital/system owned. As a requirement of participation in CPC+, which is the most sweeping and far-reaching primary care transformation initiative in terms of its geographic reach as well as its explicit care delivery expectations and enhanced payment model, CMS states that “CPC+ is a practice-level transformation and each practice owned by a hospital must provide a letter signed by hospital leadership that commits to segregate funds paid by CMS to the practice as a result of participation in CPC+” (Comprehensive Primary Care Plus FAQ Document, 2017). CMS has opened the door to a different kind of conversation between health plans and providers around this very important topic of aligning financial incentives.

Limitations

This is a cross-sectional study which allows for inferences of association, but cannot identify causation. Results are based on cost and utilization data for Blue KC members only. This is not a true practice level evaluation which limits the generalizability of these results. Practices self-select into the Blue KC Medical Home program and presumably choose the practice ownership structure that best suits their needs and preferences. There may be inherent biases represented by these decisions that influence the results of this study. The TCOC PMPM was not adjusted for price differences and interpretation of these findings must consider that

price is not addressed in this study. Finally, while cost and utilization outcomes may be associated with quality, this study does not attempt to understand how the quality aspects of the triple aim (patient experience and health improvement) are met.

Conclusion

The findings in this study present something of a dilemma to policy makers, health plans and others whose ambition is to create a healthcare landscape that improves quality and lowers the cost of care over time. If hospital/system ownership of physician practices provides the structure, resources, and capital necessary to improve the quality of care while potentially improving the work-life experience of the provider, but we are doing so at a higher cost, what implications does that have achievement of the triple (or quadruple) healthcare aims?

Given that the Medical Home practices in this study are remarkably similar except for the geographic location and ownership structure (which are correlated), the next step is to understand what drives the different financial results. Are there inherent differences in the physicians who choose to practice under different ownership structures? Are there meaningful differences in the financial incentives experienced by physicians under different ownership structures? Is the increased cost associated with hospital/system ownership of physician practices a “bubble” that is inevitable during the transition from the dominant fee-for-service driven revenue stream to one that is aligned with improvements in cost and quality?

While the findings from this study contribute to our understanding of “what works in what context”, there is still much to be learned. Future research that embraces both the quantitative and qualitative aspects of these complex systems must be employed to understand the system goals and strategies driving ownership of physician practices.

The accountable high quality primary care foundation is a necessary, but not sufficient step in achieving the lofty healthcare aims set before us. If the goal is to build high quality, accountable systems of care in the U.S., the Medical Home model serves as an important evolutionary tool for building the primary care infrastructure that serves as the foundation, but it must operate in sync with the broader system in which it exists. The next step in this journey has already begun as high quality, accountable primary care practices throughout the country create the foundation for the continued growth of Accountable Care Organizations which more fully engage specialists and hospitals in payment models that align incentives across the spectrum of care. As these models evolve, they must be cognizant and respectful of the role that primary care plays in healthcare improvement while also recognizing that the changes modeled by primary care are just the beginning – that hospital and specialists will also play key roles in changing the way healthcare is delivered to be truly successful at achieving the triple aim aspirations in the U.S.

What these findings point to is the need for a true “integrator” as described by Berwick et al. (2008) as a precondition to the achievement of the Triple Aim. This study’s findings suggest that practice ownership by a hospital or health system does not necessarily lead to the kind of integration needed to achieve efficiencies that drive cost improvements. Whether the barriers to achieving integration and resulting improvements in the cost, quality, or experience of care rest with the motivations of the system itself or are inherent in systemic structures or cultures is likely to vary from one situation to another. Future research that employs both quantitative and qualitative methods should strive to understand the motivations and barriers to change that impede achievement of true integration.

Chapter 5: Conclusion

There is broad agreement that there are many opportunities to improve the U.S. healthcare system. There is a long-held recognition across the world and in the U.S., that strengthening our primary care foundation is an essential step toward achieving these improvements. The Triple Aim goals laid out by the Institute for Healthcare Improvement (IHI) in 2008 – to improve the care experience of individuals, to improve the health of populations and to lower the per capita cost of care have been widely embraced and pursued over the last ten years. The need to “redesign primary care” in the U.S. was highlighted when the Triple Aim was originally introduced.

The Patient-Centered Medical Home (Medical Home) has provided an important vehicle for primary care redesign efforts over the last ten plus years. The focus on the Medical Home was created in part by the Patient-Centered Primary Care Collaborative (PCPCC) that was formed in 2006 through a collaboration between a group of large employers and the primary care professional societies. The signing of the “Joint Principles of the Patient-Centered Medical Home” in 2007 provided the framework by which the Medical Home model took greater definition, including an ability to achieve “recognition” by many national third-party accreditation organizations, such as NCQA, as well as independent organizations that created proprietary models and standards, such as the VA’s Patient Aligned Care Teams or “PACT.”

Summary of Findings

This dissertation contributes to the general understanding of how the Medical Home is contributing to the redesign of primary care that is essential to the achievement of Triple Aim aspirations in the U.S. The specific questions posed in this dissertation provide insights into which types of practices are more likely to adopt the Medical Home, whether its implementation

influences the way care physicians deliver care in Medical Home practice settings, and whether different ownership structures are associated with differences in the total cost of care or the utilization of high cost services - important outcomes of interest to purchasers. The willingness of healthcare purchasers to fund the Medical Home with new forms of payment (care coordination fees, shared savings, or quality bonuses) is critical to its sustainability. While healthcare purchasers are interested in a range of outcomes, including the experience and quality of care, if the Medical Home does not favorably influence the cost of care, purchasers are unlikely to provide long-term funding for it.

Evaluating the Medical Home is acknowledged as challenging due to the complexity of the model itself, the many ways in which it is defined and implemented, and the varied and changing nature of the broader healthcare landscape in which it operates. What follows is a brief discussion of three of these circumstances and challenges along with a summary of findings from this study.

1. Multiple Definitions and Recognition Requirements

There are multiple definitions for the Medical Home that each have their own set of standards or areas of focus. One systematic review conducted in 2010 found 29 different Medical Home definitions stemming from a variety of government, providers, payers, and accrediting bodies (Vest et al., 2010). While there are a plethora of definitions, models, and names, these authors also noted that there was strong agreement on a core set of features and functions of the Medical Home including coordinated care, access to care, patient-centered care, and continuity of care, all of which represent high quality primary care.

If the Medical Home is to serve as the vehicle for primary care redesign in the U.S., broad adoption of the model is essential. The first question in this dissertation was designed to

gain a greater understanding of why some primary care practices within Blue KC's service area chose to participate in the Medical Home program while others did not. My primary hypothesis was that given the complexity of the Medical Home model itself along with the variation in definition and/or requirements that different payers present to practices has the potential to create an unintended deterrent to Medical Home adoption for small primary care practices.

The best way to fully understand motivation is through a more qualitative approach which is outside the scope of this dissertation, but worthy of future consideration. For my dissertation, I used descriptive data about the primary care practices within Blue KC's network to understand whether there were meaningful differences in basic characteristics between Medical Home and non-Medical Home practices. The practice characteristics evaluated included the size of the practice as measured by the number of physicians, whether the practice was in an urban setting (defined as the 5-county Kansas City metropolitan area), the number of Blue KC attributed members per physician, and member characteristics including the average risk score and age of attributed members.

The findings in this analysis tell us that larger, more urban practices with a higher concentration of Blue KC members per physician are more likely to be Medical Homes. Medical Home practices are substantially larger at an average of five physicians per practice compared to an average of 2.4 physicians in non-Medical Home practices. In terms of size, the greatest discrepancy is found in the number of Medical Home solo practitioners. Nineteen percent of Medical Home practices have just one physician compared to 57 percent of non-Medical Homes. Medical Home practices are also more urban with 77 percent in an urban setting compared to 52 percent of non-Medical Home practices. The number of Blue KC attributed members per physician was substantially different with Medical Homes having an average of 241 members

per physician compared to 91 per physician in non-Medical Home practices. Given that there are more physicians in Medical Home practices, this difference is even more significant when measured at the practice level with Medical Home practices having almost 1,200 attributed members compared to ~200 in non-Medical Home practices. Given that the Medical Home is a practice-level intervention that requires the implementation of new processes that can be costly, such as new staff to address care coordination and manage after-hours extended access or technology investments that provide patient registries or other population health management tools, the number of patients who might benefit or for whom the practice might receive additional financial support from the payer is an important consideration. Small practices may have a hard time justifying the investments required to fulfill the expectations of the Medical Home if the attributed populations tied to new forms of payment are not of sufficient size to cover the anticipated investment.

These findings underscore the need to understand the barriers that may stand in the way of small practice participation more fully. Payers have an important role in assuring all members receive access to high quality primary care whether that care is provided by a large, small, Medical Home or non-Medical Home practice. An important premise of CPC+, the CMS primary care innovation program, is that payers need to work together to align primary care payment and performance measurement, including common quality measures and data collection methods. By working together in a more coordinated fashion, payers can ease the burden that new population-based payment models, like the Medical Home, place on primary care practices of any size. Collectively, payers also have the ability to create more meaningful revenue sources that reward high performing practices for all of their efforts not rewarded by fee-for-service payment.

One of the insights from this study is that we need to look beyond the practices themselves and understand the nature and context of the insurance market within which patients operate. If the number of attributed members per physician can be viewed as a proxy for payer influence on Medical Home participation, understanding how to strengthen that influence is an important consideration. In addition to the kind of payer collaboration advanced in the CPC+ program, one of the answers to strengthening the payer-provider relationship may be found in the nature of health plan networks and benefit designs. Over the last twenty years, employers and consumers have embraced “choice” in the form of broad provider networks and benefit designs that do not require member commitment to a primary care physician. Payers will need to balance employer and member preferences around network size, choice, and unrestricted freedom of movement across physicians with their desire to engage primary care physicians more actively in programs that hold providers accountable for the cost, quality, and experience of care for attributed populations.

2. Many Approaches to Implementation of the Medical Home

In addition to having multiple definitions, names and standards, the way in which the Medical Home is operationalized in a practice setting is highly variable. Some practices may choose to focus on care coordination while others may exert more effort on expanding access with the availability of walk-in appointments or after-hours clinics. These many different manifestations make it challenging to make broad comparisons that place all Medical Home practices in one category and all non-Medical Home practices in another. While some studies seek to understand which Medical Home processes have been implemented, my dissertation takes a different approach and evaluates differences in physician-level primary care practice patterns between Medical Home and non-Medical Home practices. This evaluation using Value

Index Scores (VIS), a 3M™ proprietary, claims-based methodology, looks at actual services received by patients across a variety of domains that are designed to look for the receipt of services that are consistent with high quality accountable primary care standards. For example, Primary and Secondary Prevention is evaluated using mammography and colonoscopy screening rates for adults and well child visits and immunizations for children. Of note is that this VIS scores are calculated at the physician level. This is helpful to understanding not only the comparison between Medical Homes and non-Medical Homes, but to gain some insight into the degree to which practicing in a Medical Home location influences physician-directed care.

My primary hypothesis was that the practice patterns demonstrated by physician in Medical Home practices would be more aligned with high quality primary care as measured by the VIS Composite score and across six domains of primary care (Primary and Secondary Prevention, Tertiary Prevention, Chronic and Follow-Up Care, Population Health Status Change, Continuity, and Efficiency). The findings in this study were somewhat mixed, but generally supported my hypothesis. Practicing in a Medical Home setting was associated with a higher VIS score at the composite level, which considers overall performance across all six domains, and in the domains of Primary and Secondary Prevention, and Tertiary Prevention. Primary and Secondary Prevention, mentioned earlier, evaluates the degree to which the physician meets the expectations for early detection screening services. The Tertiary Prevention measure evaluates the effectiveness of the physician in addressing “sick care” by looking at Potentially Preventable Admissions and Emergency Department Visits (both proprietary 3M™ methodologies) expressed as the percent difference between actual and expected.

One of the interesting observations made during this analysis is that there was a high degree of variation in VIS scores across physicians practicing in non-Medical Homes compared

to the more normally distributed scores for physicians practicing in Medical Homes. This suggests that there is some degree of practice level influence on physician behavior within the Medical Homes. Further inquiry is required to understand this better.

The mixed nature of this study's findings and the generally low R^2 values suggest that there are factors outside the scope of this study that are influential and should be considered. Using a qualitative approach to understand the influence of physician leadership or the role that staffing or processes have within specific domains could yield useful insights. Other factors such as staffing ratios, financial incentives, or whether the practice is part of a larger organization such as a hospital or healthcare system that influences how care is delivered are useful avenues of study.

There are also a broad range of factors outside the control of the primary care practice itself that one might consider. Two examples highlighted in this paper are the type of incentives embedded in the patient's insurance coverage and an understanding of the level of unmet social or economic need within the patient populations.

Understanding the contribution of the Medical Home to a more robust primary care foundation is an important step in the journey to achievement of the Triple Aim. This study demonstrates that the Medical Home model can make a difference, albeit limited. A deeper understanding of the many factors that influence how primary care "performs" is important to determining how to best position and empower primary care within the context of the broader healthcare system.

3. The Changing Landscape of Practice Ownership

Hospitals or health systems increasingly own physician practices. For the first time in 2016, the AMA reported that fewer than half of practicing physicians owned their own practice.

Understanding the motivations of both the hospitals/health systems and the physicians behind this trend is essential to developing a better understanding of its impact on the collective desire to achieve the Triple Aim. Historically, hospitals acquired practices or employed primary care physicians to gain market share by ensuring a steady flow of referrals to more costly hospital-based services. More recently, it has been suggested that forward thinking hospitals and health systems view primary care as essential to their future success under new, population-based payment models. While there was not meaningful evidence to support this perspective in this study, it is possible that there are hospitals or health systems taking this view.

One thing we do know is that primary care cannot support achievement of the Triple Aim acting completely on its own. With just six percent of healthcare spending directly attributable to primary care, it is unlikely that it has the influence in most situations to significantly change the other 94 percent of healthcare spending completely on its own. Yet, the expectation for Medical Homes, is that it will make meaningful contributions to reducing the per capita cost of healthcare, one of the Triple Aims.

This question within my dissertation explored the influence that hospital/system ownership of Medical Home practices has on total cost of care and the utilization of high cost services within the context of the Blue KC Medical Home program. The primary hypothesis was that Medical Homes owned by hospitals or health systems would have higher total cost of care and higher rates of unnecessary utilization of ED visits and inpatient admissions when compared to physician-owned Medical Home practices.

The findings from my study support this hypothesis about total cost of care and inpatient admissions. There was no relationship found between ownership and ED visits. My hypothesis was based on the knowledge that fee-for-service healthcare payments which continue to

dominate the Kansas City healthcare market. The rational behavior for hospitals and health systems in a fee-for-service market is to keep its facilities full and all services operating at maximum capacity. It is unlikely that we will see significant changes in provider behaviors until payments begin to shift to models that reward healthcare improvements to a greater degree than healthcare usage

Practice ownership does not constitute integration that drives improvements in the cost, quality, or experience of care in most instances. This study's findings support this assertion in terms of cost improvements. Whether the barriers to achieving integration and resulting improvements in the cost, quality, or experience of care rest with the motivations of the system itself or are inherent in systemic structures or cultures is likely to vary from one situation to another. Future research that employs both quantitative and qualitative methods should strive to understand the motivations and barriers to change that impede achievement of true integration.

Limitations

There are limitations that should be noted. First, all analyses used claims data along with provider and member demographic data provided by Blue KC. These data exist for administrative purposes within the context of health plan operations, such as provider claim payments, member eligibility tracking and accurate representation of provider information in the plan's provider directory. To the extent there are errors in claim payments or provider demographic information, those are included in the data used for this study. All studies are cross-sectional in nature which allows for inferences of association, but cannot identify causation. Working with data representative of the population of primary care practices that self-selected into the Medical Homes introduces inherent bias. This dissertation does not attempt to evaluate practices prior to implementation of the Medical Home model. Also of note is that these studies

only include Blue KC members attributed to the primary care practices within Blue KC's network, and as such, is not a true practice level evaluation which limits the generalizability of these results. A final limitation is that the dataset provided for this dissertation does not allow for a meaningful evaluation of Medical Home quality performance.

Implications and Conclusions

This dissertation provides useful information that contributes to the body of research that attempts to evaluate the Medical Home and its contributions to a more robust primary care infrastructure and to the improvement of cost and utilizations. The findings from the first paper (Chapter 2) confirm what others have previously found, that adoption and implementation of the Medical Home model may be less attractive to smaller practices. This is particularly true for practices in a rural setting. The findings from the second paper (Chapter 3), while mixed, are generally consistent with the findings from other studies that the delivery of care in a Medical Home setting is more consistent with high quality accountable primary care practice patterns than non-Medial Home practices. However, what sets this study apart from many others is that physician-level practice patterns were analyzed to understand the influence that working in a Medical Home practice has on physician behavior. Finally, the third paper (Chapter 4) explores the association between hospital/system ownership of Medical Home practices and the total cost of care and utilization of ED Visits and Hospital Admissions when compared to physician-owned Medical Home practices. This is a question that, to my knowledge, has not been explored directly in the context of the Medical Home. The findings from this study suggest that hospital/system ownership of Medical Homes is associated with a higher total cost of care and higher than expected Hospital Admission rates. There was no association found between

ownership and ED Visit rates. However, there was a strong association identified between the level of Medical Home implementation and the rate of ED usage.

The focus on the Medical Home model provides an important vehicle for the evolution of primary care over the last ten years. The Medical Home model provides a framework that facilitates its implementation and evaluation – but it is not the ultimate destination. Policy makers, health plans and healthcare purchasers need to shift the conversation from a focus on the Medical Home as the savior of primary care to a broader vision of how to support high quality primary care in a consistent and sustainable manner. Payers, both governmental and commercial, are uniquely positioned to drive this conversation as they directly or indirectly influence many of the aspects of the healthcare system that determine how care is delivered. Who is going to step up and accept the role of the integrator described by Berwick and his co-authors in the 2008 introduction of the Triple Aim goals remains an open question. From my vantage point, the payer is uniquely positioned to operate in this capacity. They are four key ways in which payers can exert significant control that I believe represent an important opportunity for change: 1) Deploying Population-Based Payment Models, 2) Changing the Nature of the Provider-Payer Relationship, 3) Changing the Framework for Patient Behavior, and 4) Collaborating with Other Payers.

1. Deploying Population-Based Payment Models

Fundamentally transforming primary care payments is a necessary, but not sufficient step. With direct control over such a small share (~ six percent) of total healthcare spending, primary care cannot be expected to “bend the healthcare cost curve” on its own. To be successful, new payment models need to be implemented by all payers to create sufficient impact at the organizational level, whether that is a physician practice or hospital. Payment changes also need

to be made simultaneously across all components of care delivery. Iterative changes to one component at a time are likely to result in simply “squeezing the balloon” by compensating for reductions in one area with increases in another. The aspiration of the Triple Aim is to reduce the per capita cost of care and let some air out of the balloon which can only happen if we exert equal pressure around the balloon. Finally, as suggested when the Triple Aim goals were introduced, payments need to support defined populations. Only when there is a defined population is there an opportunity to reward the desired outcomes of better care, improved health, and smarter spending over the delivery of more services.

2. Changing the Nature of the Provider-Payer Relationship

The ability for payers to influence provider behavior is strengthened when that payer represents a greater share of the provider’s revenue stream. In a fee-for-service framework, this means delivering more services. In new population-based payment models in which the amount a provider earns is driven by the number of members attributed to them and their corresponding performance on cost, quality, and experience measures for that attributed population, the relationship between the provider and the payer is fundamentally changed. The larger the attributed population, the greater the incentive is for providers and payers to work together toward improved outcomes in which all parties win – patients receive better care and improved health while the financial benefits derived from “smarter spending” accrue to all stakeholders. A true “win-win-win-win” scenario in which patients, providers, payers, and purchasers (employers and individuals) can benefit. providers and payers to collaborate in ways that were unimaginable under a heavily negotiated, fee-for-service environment.

3. Changing the Framework for Patient Behavior

Patient behavior and preferences are under-studied in the Medical Home literature. Specifically, how a patient's insurance plan influences their use of healthcare services is an area that is ripe for further study. What is clear is that the existing insurance market is built to accommodate choice more than efficiency. PPO plan designs, the most commonly found plan type in the market today, typically have no requirements or incentives to use primary care services over specialty services. Patients are free to move from provider to provider unrestricted. Provider networks are also typically quite large. In Kansas City, the predominant Blue KC PPO network includes all but two hospitals and most physicians across primary care and specialty services. These broad networks make it difficult to gain the kind of payer density required to build a significant population of attributed members that provides an opportunity to build a meaningful population-based payment strategy and payer-provider collaboration opportunity. This requires payers to rethink the broad network strategy and build new approaches to the identification of providers who are not only high performers, but also willing to rethink old ways of doing business (i.e. us against them negotiating tactics) in favor of more collaborative "win-win" approach to healthcare improvement.

4. Collaborating with Other Payers in Support of Population-Based Payment Models

Payers can "go it alone" in forging new population-based payment arrangements with providers. The potential downside is that the quality measures or data exchange methods that one payer chooses may not synchronize well with what other payers have elected to do. In the face of too many conflicting requirements and expectations, providers, particularly small primary care practices, are prone to throw their hands in the air and simply give up. If payers want to be successful working with providers, it may not be enough to collaborate differently with

providers. Payers may also need to collaborate differently with other payers. As demonstrated by the CPC+ initiative, the opportunity to reduce the burdens of new population-based payment models (tracking quality measures, providing data and reports to payers, etc.) by agreeing to align common quality measures and data collection methods can drive greater adoption and engagement of primary care physicians as demonstrated by the results coming out of the original CPCI model.

Based on these observations, my view is that payers are uniquely positioned to act in the role of the integrator outlined by Berwick, et al. in 2008. Ten years later, this role is as important to the achievement of the Triple Aim as it was when it was introduced. Who is going to fill this role is also as unknown today as it was ten years ago. In Berwick's terms, it will take "political nerve" to fulfill the role of integrator. Whoever embraces this role is someone bold enough to manage through the "pain of the transition state" and be willing to disrupt "institutions, forms, habits, beliefs, and income streams in the status quo." Berwick, et al. also note that "If we want different behavior, we will need new financing and competitive dynamics." Who is going to be the change agent that is so desperately needed? Payers sit at the intersection of the key healthcare stakeholders – patients (members), employers (purchasers), and providers (care delivery). Payers have a unique opportunity to be difference-makers if they can find the "political nerve" to do so.

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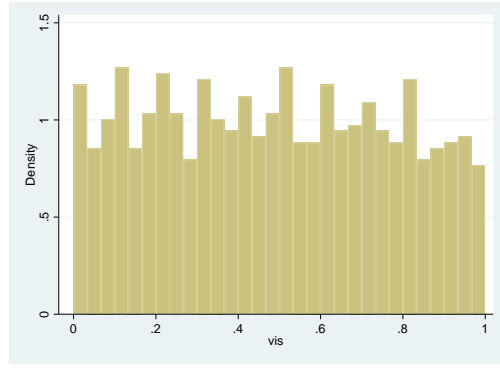
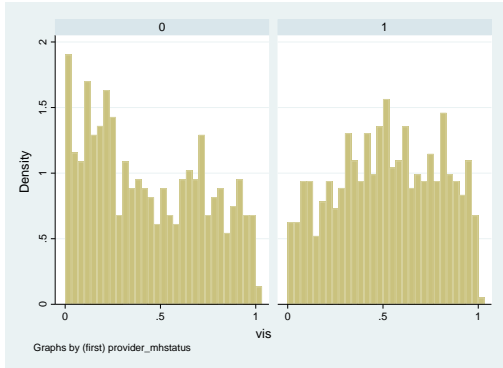
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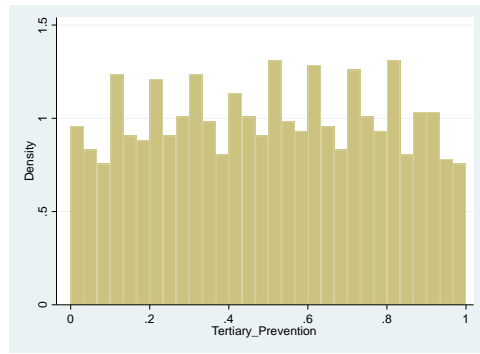
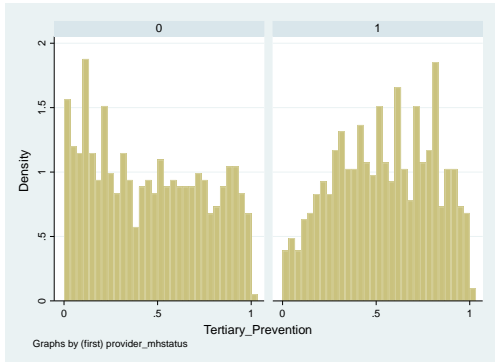
Appendices

Appendix A: Physician Value Index Scores – All and by Medical Home Practice Site (0 = Non-Medical Home and 1 = Medical Home)

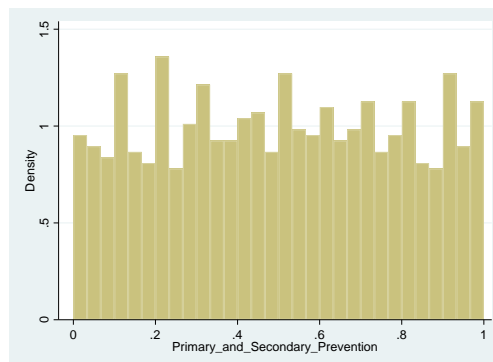
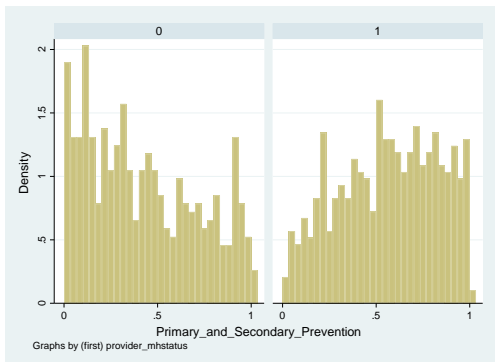
Value Index Composite Score



Tertiary Prevention

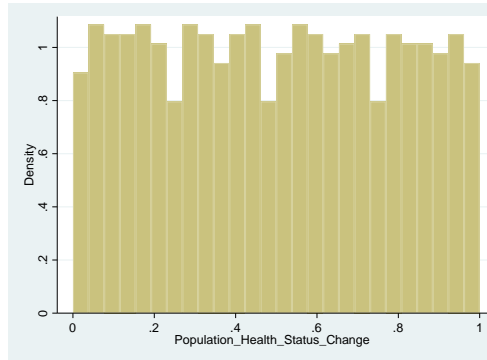
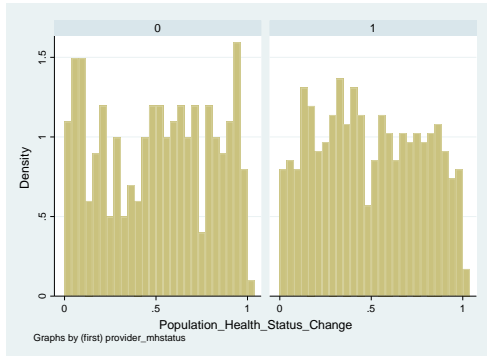


Primary and Secondary Prevention

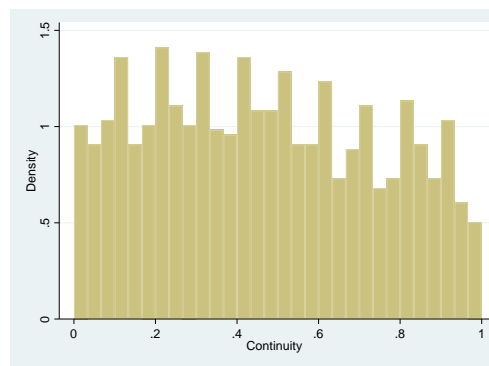
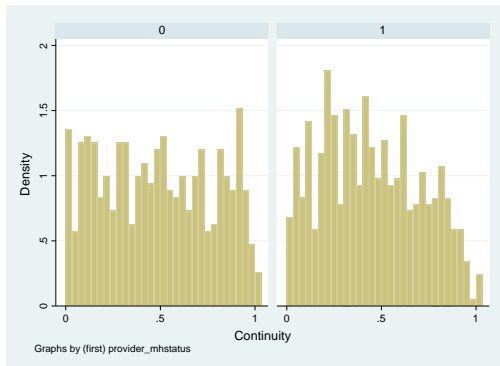


Appendix A: Physician Vaue Index Scores (continued)

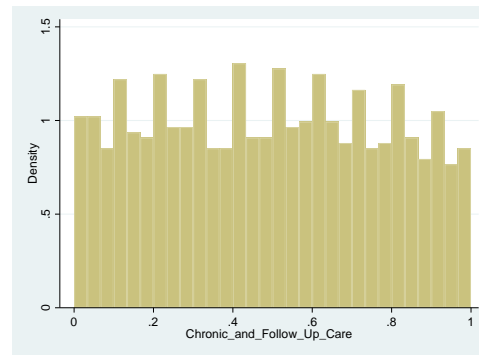
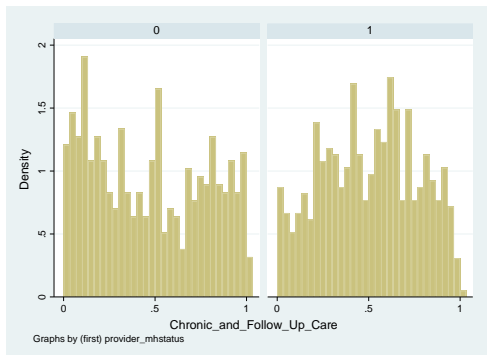
Population Health Status Change



Continuity



Chronic and Follow Up Care



Appendix A: Physician Vaue Index Scores (continued)

Efficiency

