Patient Selection and Impacts of Plan Choice on Specialty, Urgent Care Center and Emergency Department Visits and Total Expenditures when Families Choose between a Direct Primary Care Option and a Traditional Option for Employee Medical Benefits

By

Gayle Brekke
MBA, Rockhurst University, 2012
FSA, Fellow of the Society of Actuaries, 2007
BA, Saint Mary's University of Minnesota, 1988

Submitted to the graduate degree program in Health Policy and Management and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

_____
Committee Chair: Jarron Saint Onge, PhD

_____
Glen Cox, MD

_____
Aaron Katz, PhD

_____
Dorothy Hughes, PhD

_____
Edward Ellerbeck, MD

Date Defended: 26 May 2023

The dissertation committee for Gayle Brekke certifies that this is
the approved version of the following dissertation:

Patient Selection and Impacts of Plan Choice on Specialty, Urgent Care Center and Emergency Department Visits and Total Expenditures when Families Choose between a Direct Primary Care Option and a Traditional Option for Employee Medical Benefits

_____
Chair: Jarron Saint Onge

_____
Graduate Director: Jarron Saint Onge

Date Approved: 7 June 2023

Abstract

Introduction Two difficult and intractable problems in US health care are high expenditures and the state of primary care. With direct primary care (DPC), patients or employers pay directly for unlimited access to a broad set of primary care services and insurance is not used. DPC may improve primary care delivery in ways that reduce overall utilization and spending.

Purpose Determine factors associated with plan selection and quantify effects of plan selection on utilization and expenditures when an employer adds a DPC medical benefit option.

Data and Methods Data was from a large employer that added a DPC option to a "Standard" PPO option. Plans differed only in primary care delivery and DPC enrollees were required to switch to a DPC PCP.

Selection aim: family level logistic regression. Utilization and expenditures aims: member level difference-in-differences 18 months before and 39 months after first DPC offering. Expenditures excluded pharmaceuticals and included DPC fees.

Results Plan choice was associated with enrollee age, enrollee race/ethnicity, chronic conditions in the family (CCs) and usual source of care in the family (USC). DPC enrollees were younger, white or other race/ethnicity, without CCs and without a USC.

DPC increased specialist visits. DPC may have lowered urgent care center (UCC) and emergency department (ED) visits. DPC increased expenditures excluding top 1% spenders. CCs, USC and member age were associated with utilization and expenditures.

Conclusions Unlike relevant studies, DPC did not reduce ED visits or expenditures. Selection results align with prior studies. Future DPC research should examine plan selection, utilization and expenditures over time to allow changes to emerge. Future research of specialist visits should consider that new patients likely experience different referral patterns than existing patients. More research is needed to determine whether and when DPC can reduce utilization and spending.

Acknowledgements

It would not have been possible for me to achieve this milestone without the encouragement and support of a number of people.

First and foremost among the people I wish to thank individually is my husband, Eric. It was upon his urging that I looked into going back to school (again) because I had grown dissatisfied (and perhaps a bit cranky) with regard to my professional impact. Throughout the next decade as we navigated my return to grad school, leaving a 20-year career, slowly figuring out how I wanted to be impactful in the future, and working through some very difficult challenges in our personal lives, Eric's support and encouragement never wavered. For that I am eternally grateful.

Our daughter, Laura, deserves special recognition as well. Her experiences and perspectives as a nurse at a wonderful DPC practice have been vital in shaping my understanding of DPC, primary care, the health care system, patients, care givers, and on and on. I am so appreciative of Laura's ongoing willingness to share her thoughts and to dive into yet another health care conversation with me.

I am very grateful for the support of the faculty and staff at KUMC, and in particular for my dissertation chair, Jarron Saint Onge. His patience, encouragement and guidance allowed me to find my own path for making all of this make sense to me, without which I don't know that I would be here.

I appreciate the employer who shared their data with me for this research. I appreciate those who have asked me to speak or consult, and those who have responded to my newsletter or my podcast. To everyone else who has shared their thoughts or encouraged me – family, friends, doctors, actuaries, policymakers, researchers, and others – thank you.

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

The U.S. spends considerably more per capita on health care expenses than any other developed country (Lorenzoni, Belloni et al. 2014). For at least five decades, policy makers have been looking for the "holy grail," a reform that reduces spending while simultaneously improving quality of care, and to date no reform has achieved hoped-for reductions in health care spending (Tanenbaum 2009, Oberlander 2011, Marmor and Oberlander 2012). The aim of this dissertation is threefold: to examine plan selection, utilization and expenditures in a dual choice employer medical benefit offering in which a DPC plan is offered alongside a traditional PPO plan.

Direct Primary Care

Direct Primary Care (DPC) is a financing and delivery model in which patients (or employers) pay directly for care via a membership model. The median self-pay adult DPC fee was $75 per month in 2020 and the median monthly DPC fee paid by an employer for a family of four in 2021 was $158 (HintHealth 2023). DPC physicians provide unlimited access to a defined set of primary care services, including coordination and navigation services.

Early results reported by DPC practices seem to indicate the model may hold promise for improving patient health outcomes and lowering overall health care utilization and expenditures. They do not accept payment from insurance companies or other third-party payers, which frees up their time for patient care and prompts them to more fully embrace an agency/fiduciary role with their customer patients. With a full panel of roughly 25% of the patients of a traditional insurance-based primary care physician (PCP), DPC physicians may have more availability than their traditional counterparts. Yet, most of the information on DPC benefits is anecdotal and superficial. Currently, there are no peer-reviewed studies comparing

patient outcomes in DPC and traditional primary care delivery that have been published. As perhaps the single most important goal of any broad health care initiative or alternative payment model, it is critical to evaluate whether DPC can lower overall health care spending.

DPC has the potential to lower health care costs by reducing unnecessary care through specialist, emergency department, urgent care center visits and other expensive care. Emergency department (ED) and urgent care center (UCC) visits are likely reduced primarily due to 24/7 access to the DPC physician for urgent needs. In contrast, specialist visits are likely reduced by health improvement and condition stabilization over time.

Health care utilization

The *number of necessary specialist visits* is a focus of reform to reduce health care costs and is a challenging outcome in and of itself. Frequent specialist visits can indicate complex and expensive treatment due to multiple conditions (Pham, Schrag et al. 2007), and can bring challenges such as care coordination (Starfield, Shi et al. 2005) and inefficient referral processes (Mehrotra, Forrest et al. 2011). Reductions in specialist visits may promote lower health costs through decreased duplication and avoidance of conflicting messages to patients (Colwill, Frey et al. 2016). Patients whose receive most of their care from a primary care physician rather than a specialist have been shown to have lower overall health care expenditures (Franks and Fiscella 1998).

Specialty visits, expenditures and referral rates to specialists have increased significantly in recent years. From 2012 to 2016, PCP office visits and expenditures declined 18% and 6%, respectively, while specialist office visits and expenditures increased 15% and 30%, respectively (HCCI 2018); office visits do not include preventive visits. Between 1999 and 2009, the

probability that a visit to an ambulatory physician would result in a referral to another physician increased 94% (from 4.8% to 9.3%) (Barnett, Song et al. 2012). Rates of specialty referral from primary care physicians increase as demands on PCP time increase (Forrest, Nutting et al. 2006, Colwill, Frey et al. 2016).

In an effort to lower health care expenditures, there is a focus on reducing unnecessary specialist visits (Peikes, Taylor et al. 2020) and unnecessary specialty services and procedures (Cassel and Guest 2012). While visits have increased, there is evidence that these increases may be unnecessary and many specialist visits could be handled in a primary care setting (Starfield, Shi et al. 2005, Valderas, Starfield et al. 2009). Moreover, specialists tend to use more intense health care services than primary care physicians, and they prescribe more medications and more diagnostic tests (Franks, Clancy et al. 1992); expenditures are higher when more care is provided by specialists (Donaldson 1996). Studies comparing outcomes with primary care and specialty care generally find that quality is no better with specialty care and spending is higher, although findings vary by type of specialist and disease or condition being treated (Donaldson 1996, Harrold, Field et al. 1999).

Emergency Department (ED) and *Urgent Care Center (UCC) visits* are additional expensive treatment options that are linked to inadequate access to primary care (Trzeciak and Rivers 2003, Ionescu-Ittu, McCusker et al. 2007, Cheung, Wiler et al. 2012). ED crowding, a main reason that the state of emergency services in this country has been declared a crisis (Trzeciak and Rivers 2003, Kellermann 2006, IOM 2007), may be exacerbated by unnecessary ED visits that result from inadequate access to primary care. Additionally, unnecessary ED visits add to

concerns about the quality and safety of care and high spending (Dharshi 2006, Uscher-Pines, Pines et al. 2013). Less research has been done about unnecessary UCC visits.

Patient selection

In part, the ability of a model to reduce costs depends on the patients that are selecting into health care plans. *Patient selection* is an important aspect of any health insurance program or arrangement. Patient selection (i.e., the characteristics of patients who select a given option) plays into whether a reform will lower spending or otherwise perform as projected (Cutler 1999, Frech and Smith 2015). A fuller understanding of patient selection is necessary to understand the relationship between reform efforts, spending, and patient health outcomes.

In a study of patient selection in DPC, the distinction between employer-paid and individual-paid DPC is important. In a dual choice employer-paid situation, employees choose between two offerings. In this current study employees had the option of either primary care provided in a DPC model or primary care provided in a traditional insurance-based model. In this case, the decision process will likely be similar to other dual choice plans when employees are offered any two employer-sponsored medical benefit options. Employees weigh differences between the two plans according to their situation and preferences and choose one plan or the other. In contrast, people choosing to self-pay for DPC may undergo a much different and broader decision process. Self-pay DPC patients have a wider variety of circumstances, from being uninsured to having comprehensive insurance; they might choose a physician after they have decided to find a way to pay for primary care directly, or they might follow their physician to a newly established DPC practice. For purposes of this dissertation, the important point is that selection in self-paid DPC may have little in common with selection in DPC that is part of an

employer's dual choice benefit offering and the conclusions of this research should not be applied to self-pay DPC.

Research goals

The overall goal of this research is to evaluate the potential of DPC to lower overall health care spending (with a focus on specialty, emergency department, and urgent care center visits as those are areas where DPC theoretically may have considerable impact due to better availability than is provided in traditional primary care). Additionally, specialty and emergency care are two areas where many efforts have been undertaken to reduce unnecessary care and spending (Dharshi 2006, Cassel and Guest 2012). Findings of total expenditures and utilization of specialty, urgent care center and emergency care in DPC are very relevant to questions of whether DPC has the potential to begin to bend the cost curve in health care and deliver on the promise of robust primary care delivery. There is broad agreement that robust primary care is critical to the health of patients and the performance of the health care system overall (Macinko, Starfield et al. 2003, ACP 2006, Phillips, Pugno et al. 2014).

Data for this dissertation was from a natural experiment in which a large employer began to offer a DPC option in addition to a Standard option (which continued to be offered unchanged). In the DPC option, enrollees received primary care at a dedicated DPC clinic near the employer's location and benefits for non-primary care services were the same as in the Standard plan. Employee contributions to premiums were the same for both plans. Advantages of this data include 1) as a natural experiment, it represented plan choice and health care utilization in the real world, 2) pre- and post-DPC data for both groups (DPC and Standard plan enrollees) afforded the use of powerful analytic techniques including difference-in-difference

regression models, 3) nearly five years of data for approximately 2,000 employees and dependents for all types of claims (except prescription drugs) enhanced the validity and reliability of the findings, and 4) benefits and employee share of premiums were the same in both plans which suggested that plan choice was focused on primary care-related factors, which improved the accuracy of the patient selection findings.

In the remainder of this introductory chapter, the literature related to direct primary care is discussed, as well as the literature regarding the role of choice and the role of primary care in the US health care system. Additionally, a conceptual model and dissertation research objectives are provided.

1.1 Literature Review and Conceptual Model

Direct Primary Care vs traditional insured primary care

The overall premise of this research was that patient utilization and spending will be lower in a DPC model due to better availability, convenience and comprehensiveness of primary care services, as well as stronger doctor-patient relationships and better health of patients over time. Better availability in a DPC model stems from smaller patient panels and less time spent completing administrative tasks. There is, however, potential for DPC to increase spending and utilization. This could happen, for example, if patients demand more care or unnecessary expensive care, if patients have pent-up demand for care due to poor access or poor doctor-patient relationship prior to selecting the DPC option, or if unlimited access to the DPC physician reveals conditions that would benefit from more care in patients whose needs had gone unrecognized. It is also possible that sicker families choosing DPC could cause

unexpectedly high utilization and spending in the DPC plan if differences in member risk levels are not apparent to the employer.

Physicians who practice traditionally only spend about 25% of their time in face-to-face interactions with patients in the examination room (Sinsky, Colligan et al. 2016) due to the number of administrative tasks that they must complete. As DPC physicians do not deal with third party payers like insurance companies, Medicare and Medicaid, they only do documentation and other administrative tasks that enhance patient care or are needed to run their business. DPC physicians offer same day appointment availability, longer appointments (up to 60 minutes), and house calls are common (Alexander, Kurlander et al. 2005); they offer responsiveness via various communication methods and after-hours access via phone or text. They may have time for activities that primary care physicians practicing traditionally have little time for, including research, coordination, navigation, and practicing to the full scope of their training. One reason to hypothesize that improved availability leads to improved outcomes is that visit length is correlated with patient trust (Landau, Bachner et al. 2007) and patient trust is correlated with use of preventive services, behavior modification and treatment adherence (Thom, Hall et al. 2004, Jones, Carson et al. 2012).

Value is another key difference between DPC and traditional primary care delivery. With more time to devote to each patient and in the absence of pressure to satisfy wishes of third-party payers, DPC physicians often work to provide as much value to the patients and employers as possible; it is much like the direct relationship between a service provider and a customer in other sectors of the economy, the service provider has incentives to act as the agent and fiduciary of the customer.

Primary care physicians who are more overloaded have been shown to have higher rates of referral to specialists (Anderson 2010). Compared to PCPs practicing traditionally, DPC physicians may have more time to evaluate the patient, may provide more continuity of care (Grembowski, Schaefer et al. 2014, Gruneir, Bronskill et al. 2016, Cole 2018), may be more likely to conduct diagnostic or therapeutic procedures themselves rather than referring (Forrest and Starfield 1996), and are more likely to use electronic consult services (Freeman and Hjortdahl 1997, Franks and Fiscella 1998) which often avoids a specialist referral. Strong doctor-patient relationships (Musich, Wang et al. 2016, Pereira Gray, Sidaway-Lee et al. 2018) and trust (interpersonal effectiveness) may mean that DPC physicians are less likely to refer for reasons related to trust, adherence or patient education (Forrest and Starfield 1996) and that patients are less likely to self-refer. Having sufficient time for primary care visits reduces the urge to triage patients to specialists and may decrease duplication and avoid conflicting messages to patients (Colwill, Frey et al. 2016). Patients who receive most of their care from a primary care physician rather than a specialist have been shown to have lower overall health care expenditures (Franks and Fiscella 1998).

DPC and emergency department utilization

There are a number of reasons to hypothesize that DPC will lower ED utilization. A strong doctor-patient relationship, physician responsiveness, 24/7 access to the physician for urgent needs, same day appointment availability, and the variety of available communication methods may encourage the patient to seek care or advice from the DPC physician before considering a trip to the ED. The broad scope of practice that is typical with DPC may further reduce ED use; DPC physicians tend to take care of more problems themselves than traditional

primary care physicians. The incentives created by the direct relationship between patient and physician in DPC may motivate the physician to prevent unnecessary ED use; additionally, the absence of a relationship between the DPC physician and third-party payers means the DPC physician does not have conflicting incentives to increase hospital revenue with admissions or ED visits that may not be necessary, for example.

Numerous studies have examined characteristics of patients with non-urgent ED visits and their reasons for seeking care in the ED. Most studies cite barriers to primary care access as the main reason given for seeking care in the ED for non-urgent complaints. For example, patients report barriers such as not being able to get an appointment with their PCP, not having a usual source of care other than the ED, lack of after-hours appointment availability, and cumbersome PCP scheduling systems (CHCF 2006, Ben-Isaac, Schrager et al. 2010). These barriers may be all but eliminated in DPC.

Evidence about DPC

Although evidence about patient outcomes in DPC is quite scant, similar models provide evidence of potential DPC benefits. Practice models with small panels and increased access to primary care have shown significantly better patient outcomes for its patients compared to similar patients receiving traditional primary care (Klemes, Seligmann et al. 2012, Musich, Klemes et al. 2014, Musich, Wang et al. 2016). Also, several of these studies examined hospital admission and readmission rates and overall health care expenditures. For example, between 2006 and 2010, members of this DPC-like practice were between 42% and 62% less likely to be hospitalized than similar non-member populations (Klemes, Seligmann et al. 2012, Musich, Klemes et al. 2014, Musich, Wang et al. 2016).

Data reported in 2010 by DPC practice Qliance showed DPC patients experienced 35% fewer hospitalizations, 65% fewer emergency department visits, 66% fewer specialist visits, and 82% fewer surgeries compared to regional benchmarks (Page 2013). Data from 2013-2014 that Qliance reported for selected large employer clients showed claims for DPC patients (including DPC fees) were 19.6% lower than claims for patients that received traditional primary care (excluding prescription drug costs) (NAHU 2018). DPC company Nextera published a case study in 2016 that showed a 25.4% reduction in claims costs for Nextera members of an employer compared to a 4.1% reduction for non-Nextera members of the employer (Nextera 2016). The study reflects the experience of 205 employees and dependents enrolled in Nextera. DPC practice Iora, which only cares for people over age 65, reported that patients who were 1.5 to 2 times sicker than average Medicare beneficiaries (according to risk models) saw hospital admissions drop by half and ED visits decline by 20% (Rubin 2018).

However, reliable and valid research remains scarce. For instance, the Qliance, Nextera and Iora results were self-published and were not subjected to the scrutiny and rigor of publication in peer-reviewed academic journals, including rigorous analysis of patient selection of their plans and providers. This study of DPC will be an important contribution to the literature as it will be the first rigorous study of patient selection, utilization, and expenditures in a true DPC model to determine whether DPC can deliver lower utilization and expenditures as suggested by reports published by DPC practices and by studies of similar models of primary care delivery.

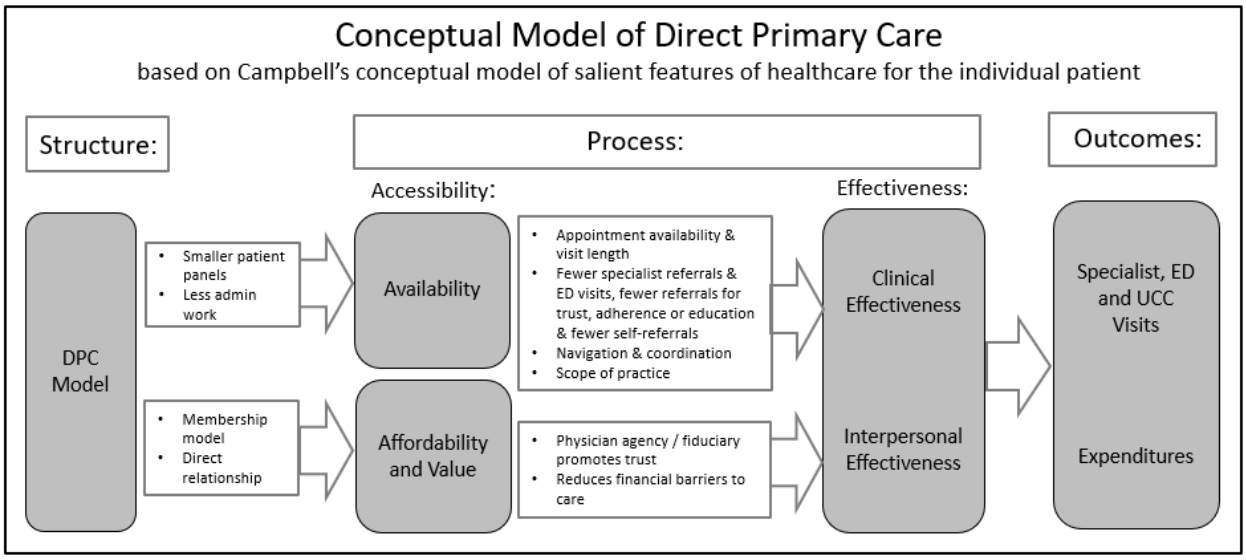
Figure 1.1 illustrates the factors that I hypothesized contribute to differences in outcomes between DPC and traditional primary care delivery. This conceptual model is

descriptive only. Factors shown will not be directly measured or studied. Rather, this research evaluates differences in utilization and spending outcomes by model, after adjusting for selection differences.

I hypothesize that structural aspects of DPC that drive its improved availability are smaller patient panels and less administrative work that result from not using insurance, and that the structural aspects of DPC that drive its improved affordability and value are the direct relationship and membership model of flat monthly fees for unlimited access to a defined set of primary care services. Availability and affordability/value can be thought of as two aspects of accessibility. Availability is comprised of same day appointments, longer visits, 24/7 access for urgent needs, broad scope of practice, and so forth. Affordability/value is comprised of ways that DPC reduces financial barriers to care. If better access and better health over time reduce downstream spending, then DPC can be said to reduce financial barriers to care and provide improved value. Financial barriers to care are also reduced if DPC reduces specialist visits and other downstream care through broad scope of practice and aligned incentives.

I hypothesize that these accessibility elements drive improved clinical and interpersonal effectiveness in DPC. Clinical effectiveness and better patient health outcomes, I hypothesize, result from aspects of DPC such as same day access, longer visits, and reduced financial barriers to care. Interpersonal effectiveness would include improved doctor-patient relationship characterized by trust and aligned incentives. I hypothesize that improved clinical and interpersonal effectiveness in DPC may be the main drivers of improved utilization and expenditure outcomes over time.

Figure 1.1. Conceptual Model of Direct Primary Care



The role of choice in the US health care system

The US health care system is characterized by a large variety of insurance plans and coverage options, and plan choice is prevalent among all segments of the population. In a system such as this, characteristics of participating patients (age, sex, health status and many others) are important determinants of results overall as well as for each insurance plan or coverage option separately. Who is enrolled in a plan is perhaps the biggest factor that determines its results such as health outcomes, quality of care, and health care expenditures. In the rest of this section, first is discussion of the role of choice in markets generally, the role of choice in group medical insurance markets in particular, and the role of choice in the US health care system.

When customers can choose between two or more options for a good or service they wish to acquire, they will compare prices and product features and decide which tradeoff between price and features they prefer. Certain types of customers tend to prefer certain

features; in addition, similar customers tend to view the tradeoffs similarly and tend to be willing to spend at similar levels. This is often referred to as customer segmentation. Successful businesses understand preferences of different customer segments (groups of customers who are similar in characteristics such as age, sex, income and education level), and they design, price and market products to different customer segments differently to optimize sales and revenue (Barron and Hollingshead 2002).

Choice in insurance markets is frequently more consequential than choice in most other markets because insurance is contingent. While a customer purchasing a widget has a clear understanding of what they will receive before they engage in a transaction, the customer purchasing health insurance cannot accurately predict exactly what health care they will receive or require. They are purchasing protection against some of the financial costs of health care that they may want and need in the future, and that satisfies provisions of the insurance contract. What care will be wanted and needed in the future is uncertain. Importantly, while the nature of a widget and the cost to produce it does not vary by customer segment, the nature and cost of health care varies dramatically by customer segment. As insurance premiums are essentially expected claims loaded for expenses, contingency margin and profit, the cost of health insurance also varies dramatically by customer segment. Younger and healthier customers, for example, use a fraction of the health care that older and sicker customers use, and thus actuarially fair premiums for younger, healthier people will be a fraction of those of older, sicker people. Who the customers are, that is, the characteristics of patients enrolled in a health insurance plan, is perhaps the most significant factor that determines how much health care is used, how much the care costs, whether patient health is

declining or improving, and numerous other health plan results and patient outcomes (Cutler 1999, Frech and Smith 2015).

Group insurance plans must be able to predict the mix of people who enroll, particularly when there is plan choice. Group insurance rates are developed with consideration of demographic and socio-economic factors of the eligible population, as well as factors that represent the coverage being offered (e.g., plan design, network variables, and cost sharing provisions). Premium rates also depend on participation levels and whether group members have a choice between two or more options. These factors together provide vital information about the covered population and their expected costs for the next coverage period. Utilization and spending per person vary dramatically across a group, based on enrollee characteristics. Using age as an example, the youngest employees (ages 18-24) have per capita expenditures of 25-40% that of the oldest employees (ages 55-64) (HCCI 2019); age of enrollees and how participation levels vary by age are critical determinants of plan expenditures and premiums. Similarly for other demographic and socio-economic characteristics of the group's members, plan expenditures will vary to the extent that enrollment varies by these factors.

The US health care system is characterized by a large variety of insurance plans and coverage options, and plan choice is prevalent among all segments of the population, whether covered through an employer or other group, a government program or individually. Rather than the government specifying what plan people must have or simply providing each person with a plan, as in some countries, choice is a defining characteristic of health care delivery in the US. Next, plan choice in the most prominent government plans is discussed.

Those over age 65 and others eligible for Medicare choose between fee for service Medicare and Medicare Advantage plans, and several variations of optional Medicare drug coverage are offered as well; in addition, half of beneficiaries who choose fee for service Medicare purchase one of numerous supplemental plans offered by dozens of insurance carriers (AHIP 2020). In 2021 the average Medicare beneficiary had access to 33 Medicare Advantage plans, which is the most in a decade (Biniek 2020). Choice is also available to many Medicaid beneficiaries (MACPAC , MACPAC). Plan choice is a critical element of the US health care system, and lack of plan choice is seen as a deficiency. For example, the Affordable Care Act is seen as less than successful to the extent that fewer than two plans are offered in some counties (Anderson 2018, Hall 2020).

Plan choice is also prevalent in employer-sponsored medical benefits in the US. As of 2018, 55% of the population had employment-based coverage (Berchick E.R. 2018). Many families in which both adults are employed have coverage options from both employers; the family evaluates plan characteristics such as networks, plan provisions, payroll deductions and out of pocket costs for all options before deciding which plan(s) to use for family members. About 60% of covered employees have choice of health plans (Gabel 1999, Claxton, Rae et al. 2018).

Patient selection, that is, characteristics of patients enrolled in a coverage option, is central to the financing and delivery of health care in the US. As such, it is one of the most fundamental aspects of a health care financing and delivery model that must be understood before results achieved by the model can be understood. Without a rigorous understanding of patient selection, it is not possible to accurately determine whether a financing and delivery

model achieves favorable results or is simply a reflection of unique selection effects. Studies must ensure that effects of patient selection are untangled from effects of the model so that accurate conclusions about the model's effects can be formed.

Numerous studies of patient selection were done in the 1980s and 1990s but there is a relative paucity of studies of patient selection of employer-sponsored plans in more recent years. It is reasonable to suspect that enrollees' selection patterns may have changed in the last 30+ years as health care treatments, coverage options, and laws and regulations related to virtually every aspect of the financing and delivery of health care have changed considerably in the intervening years. Additionally, no studies of selection of DPC plans have been done, and no studies of plan choice when options differed only in elements related to primary care were found in a thorough literature review. Next, the role of primary care in the health care system and the challenges primary care is facing today are discussed.

Primary care: role and challenges

In 1994, the Institutes of Medicine updated the definition of primary care. "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" (Donaldson 1996, p. 31).

There is widespread agreement that the availability of robust primary care is critical to the health of patients and the performance of the health care system overall (Macinko, Starfield et al. 2003, ACP 2006, Phillips, Pugno et al. 2014). Ideally, patients should receive a majority (80-90%) of care in a primary care setting. As evidence, having a primary care usual

source of care is strongly and statistically significantly associated with less use of specialists and emergency rooms (Starfield, Shi et al. 2005) and lower five-year mortality rates after controlling for health, demographic and insurance factors (Franks and Fiscella 1998).

Comprehensiveness, or the breadth of a PCP's scope of practice, is an important characteristic of primary care. Primary care is comprehensive "to the extent to which primary care practitioners provide a broader range of services rather than making referrals to specialists for those services" (Starfield, Shi et al. 2005). Comprehensiveness may also be characterized as "the provision of care across a broad spectrum of health problems, age ranges, and treatment modalities" (Bazemore, Petterson et al. 2015).

A key distinction between primary care and care provided elsewhere in the health care system is the prioritization of the ongoing doctor-patient relationship, and trust in particular. While trust is an important aspect of any business transaction, it is particularly important for transactions involving a long-term relationship in which repeated interactions happen over time in continuity of care. Trust can be thought of as "optimistic acceptance of a vulnerable situation in which the truster (here, the patient) believes the trustee (here, the physician) will care for the truster's interests (Hall, Dugan et al. 2001)." Trust is optimistic acceptance in the sense that the truster believes trust is warranted and will be beneficial going forward. Trust is important for long term health care relationships between patient and provider as vulnerability and uncertainty are inescapable aspects of health and health care (Sirdeshmukh, Singh et al. 2002, Fiscella, Meldrum et al. 2004). Trust appears to strengthen therapeutic processes and has an indirect influence on health outcomes by affecting treatment adherence, care continuity and patient satisfaction. A doctor-patient relationship characterized by trust seems to encourage

patients to access future health care and to disclose information needed for timely and accurate diagnoses (Calnan and Sanford 2004, Cook, Kramer et al. 2004).

To better understand the potential of DPC to reduce specialty and other utilization, it is useful to consider how primary care compares and contrasts to specialty care. Primary care is first-contact, comprehensive, continuous, and coordinated care that is provided regardless of organ system or disease (Starfield 1994). As generalists, primary care physicians have broader training and focus than specialists. Unlike specialty care, primary care is whole person rather than disease or body system focused; challenges of primary care include dealing with vague symptoms and difficult to resolve problems (Starfield 1994, Starfield 1997). As specialty care is focused on certain diseases and/or organ systems, it is not usually where patients first contact the health care system with a new concern, and it is less comprehensive, continuous and coordinated than primary care. Specialty care tends to focus more on procedures than primary care, which may lead to higher intensity of services and more diagnostic tests than with PCPs. Specialists tend to use more resources (medications, procedures, ancillary services and longer hospital stays); as a result, patients who receive more of their care from specialists tend to have higher expenditures, all else equal (Donaldson 1996).

Shortages of primary care clinicians create access problems for many patients, including long waits for appointments, short visits, delayed care and unmet health care needs (Mollborn, Stepanikova et al. 2005); relationships and trust suffer when patients cannot get in to see their clinician and when visit time is short. PCP shortages also contribute to physician burnout and overwhelm. PCPs have long received much lower compensation than specialists (Tu and Ginsburg 2006, Bodenheimer, Berenson et al. 2007), which reduces the interest of medical

students in pursuing primary care, further exacerbating the PCP shortage and patient demand on PCPs. Additional administrative burden continues to rise as data capture, reporting, electronic medical records (EMRs), insurance pre-approvals and many other administrative tasks are required of PCPs. Burnout, overwhelm and career dissatisfaction have been a problem for physicians, and primary care physicians in particular, for many years and show no signs of abating. In one study, the prevalence of burnout in 2011 increased in all specialties in 2014; in family medicine burnout increased from 51.3% to 63.0% from 2011 to 2014; satisfaction with physician work-life balance also declined between 2011 and 2014 (Shanafelt, Hasan et al. 2015).

The difficult and long-standing challenges of the U.S. health care system have been characterized, in part, as the failure of primary care to deliver its core tenets, comprehensive, whole-person, longitudinal care to all Americans consistently and with high quality. Given the central, foundational role that primary care plays in the delivery of health care, its challenges affect patients and primary care providers (PCPs) directly, and the demand for downstream care increases when patients cannot access timely comprehensive primary care (Kushnir, Greenberg et al. 2014, Hefner, Wexler et al. 2015). Using more downstream care (specialists, urgent care, emergency departments and hospitals) because primary care is unavailable leads to higher spending and worse health outcomes (Starfield, Shi et al. 2005, Musich, Klemes et al. 2014, Peikes, Taylor et al. 2020). All parts of the health care system, all types of services and providers, and all Americans as patients and taxpayers are negatively affected when primary care cannot fulfill its core tenets (ACP 2006). The importance of considering the effects of DPC on chronic condition patients is discussed next.

Outcomes of chronic condition patients

Chronic conditions are illnesses and impairments that are expected to last a year or more, limit what one can do, and/or may require ongoing medical care (Anderson 2010). Chronic conditions (CCs) are important in this research for four primary reasons. First, CCs are important for selection, as healthy patients tend to choose different plans than patients with CCs. Second, CC patients are some of the sickest, most challenging and most expensive patients, and are often poorly served in the traditional insurance-based health care system**.** Third, characteristics of DPC might be particularly valuable for CC patients. Fourth, CCs matter to employers due to both direct and indirect costs associated with poor health.

First, health status may be related to plan choice when patients select a plan. For example, they may consider benefit levels or specific benefits related to their health needs. Health status has been operationalized for selection studies using various approaches, including self-rated health, health care utilization or expenditures, currently being under care for a chronic condition, presence of specific chronic conditions, or the total number of chronic conditions. Chronic conditions play a role in all of these approaches as patients with CCs tend to have poorer self-rated health and higher utilization and expenditures (Latham and Peek 2013, Lee, Shi et al. 2014, Ge, Ong et al. 2019); the last two approaches (presence of specific conditions and the total number of conditions) use chronic conditions directly as the studied variable(s). Examining selection by chronic condition variable(s) will shed light on selection by health status, which will be more fully discussed in the literature review in Chapter 2.

The second reason that chronic conditions are valuable for this research is that CC patients are some of the sickest and most complex patients, they are often challenging to care

for and poorly served by the health care system. While the largest concentration of chronic conditions exists in the elderly population, chronic conditions affect people of all ages. The most prevalent chronic conditions among people aged 18 to 64 are hypertension (30%), hyperlipidemia (20%), respiratory diseases (19%) and diabetes (12%) (Anderson 2010). The presence of one or more chronic conditions is associated with significantly higher expenditures and higher utilization in all major service categories, even after controlling for important confounding variables (Anderson 2010, Lee, Shi et al. 2014). As early as the 1990s, meeting the complex needs of patients with chronic conditions has been said to be the single greatest challenge facing organized medical practice today (Wagner 1998), and the focus on patients with one or more chronic conditions has not waned.

Optimal results for patients with a chronic condition require successful navigation of both medical and psychosocial challenges. The long-term nature of chronic conditions means that the focus is on managing symptoms to achieve the best functional status, quality of life and ability to cope with their illness rather than on a cure or other shorter-term outcome. Self-management strategies are increasingly recognized as an essential component of chronic condition care, should reflect be individual patient preferences and circumstances, and should support patient participation in their care (Jordan, Briggs et al. 2008, Grembowski, Schaefer et al. 2014, Dineen-Griffin, Garcia-Cardenas et al. 2019). The evidence is considerable that self-management and behavioral change programs improve important health outcomes for many chronic conditions including arthritis, chronic obstructive pulmonary disease, coronary heart disease, diabetes, hypertension and others (Wagner, Austin et al. 1996). However, the delivery of effective chronic condition management in primary care is hampered by the worsening time

constraints and financial incentives to see more patients in less time (Bodenheimer, Wagner et al. 2002, Grembowski, Schaefer et al. 2014).

The practice style prevalent in traditional primary care practice also contributes to chronic condition patients being poorly served. Traditional PCPs may not have time and the flexibility to spend enough time with more complex patients. As demands on the time of PCPs increases, consultations are increasingly focused on specific clinical tasks and the rate of specialty referral increases (Forrest, Nutting et al. 2006, Colwill, Frey et al. 2016). The fact that most scientific evidence on which disease specific quality measures are based explicitly excludes patients with chronic conditions (Fortin, Dionne et al. 2006) further necessitates that PCPs spend enough time with patients to understand their goals and develop appropriate treatment plans. Yet prominent payment schemes do not typically provide additional payment for either care coordination or additional time spent with complex patients to prioritize patient preferences or treatment options, and to provide education and support for behavior change and self-management (Bodenheimer, Wagner et al. 2002, Stange and Ferrer 2009, Grembowski, Schaefer et al. 2014).

Chronic conditions are prevalent and are becoming more so (Fortin, Bravo et al. 2005). One in four adults younger than 65 who receive health care have multiple chronic conditions (Anderson 2010). A focus on better caring for patients with one or more chronic conditions is warranted due to their prevalence and their considerable challenges for patients and the health care system.

The third reason why it is important to consider chronic conditions in this research is that direct primary care might provide care that is particularly beneficial to the challenges CC

patients face. The incentives inherent in a direct relationship between physician and patient promote a practice style that contrasts significantly with the practice style of traditional insurance-based PCPs, and the DPC practice style is of particular value to CC patients. Additionally, the fiduciary trust of a direct relationship allows for strong doctor-patient relationships, which have benefits for CC patients. Finally, additional aspects of DPC practice that are relevant when an employer pays for DPC membership fees for employees and dependents are considered.

In a direct relationship, the physician does not experience the conflict of interest of being expected to serve the interests of both the patient and the insurance company, health plan, or government program, and the financial pressures of managed care that contribute to short visits, lack of flexibility to spend more time with CC patients, smaller scope of practice, and poor care coordination (Shortell, Waters et al. 1998, Thom, Hall et al. 2004) are absent. When patients receive more care and less costly care through the DPC practice, they are getting more value for their DPC membership. DPC physicians are motivated to view patients as customers; they want patients to be satisfied with the care they receive so they continue to be a member and so they tell others of their good experiences at the DPC practice, thereby helping the practice to grow. The financial incentives of the DPC physician and the patient are aligned. DPC physicians can provide value in numerous ways, including broader scope of practice, fewer specialist referrals, use of electronic consult services rather than referrals for specialist visits, dispensing prescription medications at wholesale, deep discounts for labs and imaging for cash-paying patients, coordination of care, and navigation of downstream care when it is needed. All of these value-adds are important for CC patients.

Trust is particularly important in the context of chronic illness because of enhanced patient vulnerability, uncertainty regarding outcomes, and increased dependence on health care providers over extended periods of time (Wagner, Bennett et al. 2005, Calnan, Rowe et al. 2006). In short, DPC seems to hold promise to remedy the ways that traditional insurance-based primary care delivery provides poor care for patients with chronic conditions.

The fourth reason that it is important to examine chronic conditions in this research is that CCs matter to employers due to both direct and indirect costs associated with poor health. Chronic conditions are quite prevalent with about half of the US population living with one or more chronic conditions and about 73% of privately insured health care spending going to care for CC patients (Anderson 2010). Prudent employers pay close attention to the impacts of chronic conditions among employees and dependents due to the prevalence and high direct expense of these conditions, as well as indirect or hidden costs of poor health. Indirect costs and business disruptions from employee absenteeism and presenteeism can be considerable.

Absenteeism refers to the absence of an employee due to illness, either a personal illness or as a caretaker for a sick dependent. When employees are absent from work, it often creates a burden on the company not only for lost productivity but also for those who are responsible for the absent employee's neglected work. Presenteeism refers to employees who are legitimately ill but continue to come to work. Problems with presentees include putting other employees at risk if they are contagious, being less productive and producing a lower quality of work. Presenteeism is associated with seasonal allergies, asthma, migraines and other kinds of headaches, back pain, arthritis, gastrointestinal disorders, and depression; not all of these conditions are considered chronic conditions.

It is difficult to measure indirect costs such as presenteeism, and the degree of impact on productivity and quality of work will vary by the employee's job function and the condition. Still, research indicates that costs are considerable. Studies have found that less time is lost from people staying home than from them showing up with pain or depression but not performing at full capacity (Stewart, Ricci et al. 2003, Stewart, Ricci et al. 2003); presenteeism estimates range from 20% to 60% of the employer's total health-related costs (Goetzel, Hawkins et al. 2003, Goetzel, Long et al. 2004). Research objectives of this dissertation are discussed next.

1.2 Dissertation Research Objectives

In general, there are ongoing efforts to reduce unnecessary emergency care and specialist visits as a means of reducing overall health expenditures. For example, in 2012 the American Board of Internal Medicine Foundation launched the Choosing Wisely campaign to reduce unnecessary tests and procedures by promoting patient and physician conversations about making wise treatment choices. As part of the first phase of Choosing Wisely, each of the nine participating specialty societies developed a list of 5 tests, treatments, or services common in their specialty that are often unnecessary or for which benefits are unlikely to outweigh risks (Cassel and Guest 2012).

As much as 30% of health care spending is estimated to be wasted on nonbeneficial services (Fisher, Bynum et al. 2009). While this estimate includes all levels of care, given that specialty care has higher expenditures with no higher quality than primary care, lower specialty referral rates in theory should lower expenditures without lowering quality (Donaldson 1996, Harrold, Field et al. 1999). Yet, it is unclear what changes in primary care delivery will lower

specialty referral rates, urgent care center, and emergency department visits. Accordingly, this research set out to understand the potential associations of a DPC model choice and health care utilization and spending. It examined the extent to which Direct Primary Care may lower specialist, ED and urgent care center visits and total expenditures, while better understanding the role of patient selection characteristics.

After this introductory Chapter, Chapter 2 focused on the role of selection into a DPC Model. I examined the characteristics of families, including demographics, socio-economic characteristics, health status and whether they tended to repeatedly see the same PCP. The goal was to determine which characteristics were associated with plan choice. Findings from this chapter were then utilized in subsequent chapters with statistically significant variables associated with plan choice incorporated as control variables. Chapter 3 examined the association between plan choice and specialist visits. Chapter 4 examined the link between plan choice and urgent care center and emergency department visits. In each of these chapters the goal was to determine how plan choice affected the number of relatively high cost visits after controlling for factors associated with plan choice or utilization. Chapter 5 examined health care expenditures by plan to determine how plan choice affected expenditures after appropriate controls. Chapter 6 reviewed and synthesized each of the chapters, drew overall conclusions and recommended further research needed to better understand how families select DPC in a dual choice employer-sponsored setting and how DPC affects utilization and expenditures.

1.3 Works Cited

ACP (2006). The Impending Collapse of Primary Care Medicine and Its Implications for the State of the Nation's Health Care. Philadelphia, PA, the American College of Physicians.

AHIP (2020). The State of Medicare Supplement Coverage: Trends in Enrollment and Demographics, America's Health Insurance Plans.

Alexander, G. C., J. Kurlander and M. K. Wynia (2005). "Physicians in retainer ("concierge") practice. A national survey of physician, patient, and practice characteristics." J Gen Intern Med **20**(12): 1079-1083.

Anderson, D., Sandoe, E. (2018). "A Framework for Evaluating Medicaid Buy-in Proposals." Health Affairs Blog.

Anderson, G. (2010). Chronic Care: Making the Case for Ongoing Care, Agency for Healthcare Research and Quality.

Barnett, M. L., Z. R. Song and B. E. Landon (2012). "Trends in Physician Referrals in the United States, 1999-2009." Archives of Internal Medicine **172**(2): 163-170.

Barron, J. and J. Hollingshead (2002). "Making segmentation work." Marketing Management **11**(1): 24-28.

Bazemore, A., S. Petterson, L. E. Peterson and R. L. Phillips, Jr. (2015). "More Comprehensive Care Among Family Physicians is Associated with Lower Costs and Fewer Hospitalizations." Ann Fam Med **13**(3): 206-213.

Ben-Isaac, E., S. M. Schrager, M. Keefer and A. Y. Chen (2010). "National profile of nonemergent pediatric emergency department visits." Pediatrics **125**(3): 454-459.

Berchick E.R., B. J. C., Upton R.D. (2018). Health Insurance Coverage in the United States: 2018, U.S. Census Bureau.

Biniek, J. F., Freed, M., Damico, A., Neuman, T. (2020). "Medicare Advantage 2021 Spotlight: First Look." Retrieved November 8, 2021, from https://www.kff.org/medicare/issue-brief/medicare-advantage-2021-spotlight-first-look/.

Bodenheimer, T., R. A. Berenson and P. Rudolf (2007). "The primary care-specialty income gap: why it matters." Ann Intern Med **146**(4): 301-306.

Bodenheimer, T., E. H. Wagner and K. Grumbach (2002). "Improving primary care for patients with chronic illness: the chronic care model, Part 2." JAMA **288**(15): 1909-1914.

Calnan, M., R. Rowe and V. Entwistle (2006). "Trust relations in health care: an agenda for future research." J Health Organ Manag **20**(5): 477-484.

Calnan, M. W. and E. Sanford (2004). "Public trust in health care: the system or the doctor?" Qual Saf Health Care **13**(2): 92-97.

Cassel, C. K. and J. A. Guest (2012). "Choosing wisely: helping physicians and patients make smart decisions about their care." JAMA **307**(17): 1801-1802.

CHCF (2006). Overuse of Emergency Departments Among Insured Californians, California Health Care Foundation.

Cheung, P. T., J. L. Wiler, R. A. Lowe and A. A. Ginde (2012). "National study of barriers to timely primary care and emergency department utilization among Medicaid beneficiaries." Ann Emerg Med **60**(1): 4-10 e12.

Claxton, G., M. Rae, M. Long, A. Damico and H. Whitmore (2018). "Health Benefits In 2018: Modest Growth In Premiums, Higher Worker Contributions At Firms With More Low-Wage Workers." Health Aff (Millwood) **37**(11): 1892-1900.

Cole, E. S. (2018). "Direct Primary Care: Applying Theory to Potential Changes in Delivery and Outcomes." J Am Board Fam Med **31**(4): 605-611.

Colwill, J. M., J. J. Frey, M. A. Baird, J. W. Kirk and W. W. Rosser (2016). "Patient Relationships and the Personal Physician in Tomorrow's Health System: A Perspective from the Keystone IV Conference." J Am Board Fam Med **29 Suppl 1**: S54-59.

Cook, K. S., R. M. Kramer, D. H. Thom, I. Stepanikova, S. B. Mollborn and R. M. Cooper (2004). Trust and Distrust in Patient-Physician Relationships: Perceived Determinants of High- and Low-Trust Relationships in Managed-Care Settings. Trust and distrust in organizations: Dilemmas and approaches. New York, NY, US, Russell Sage Foundation**:** 65-98.

Cutler, D., Zeckhauser, R. (1999). "The Anatomy of Health Insurance." National Bureau of Economic Research.

Dharshi, A. (2006). "The future of emergency care in the United States health system: a report from the Institute of Medicine." J Pediatr Surg **41**(11): 1793-1798.

Dineen-Griffin, S., V. Garcia-Cardenas, K. Williams and S. I. Benrimoj (2019). "Helping patients help themselves: A systematic review of self-management support strategies in primary health care practice." PLoS One **14**(8): e0220116.

Donaldson, M., Yordy, K., Lohr, K., Vanselow, N. (1996). Primary Care: America's Health in a New Era. Washington DC, National Academy Press.

Fiscella, K., S. Meldrum, P. Franks, C. G. Shields, P. Duberstein, S. H. McDaniel and R. M. Epstein (2004). "Patient trust: is it related to patient-centered behavior of primary care physicians?" Med Care **42**(11): 1049-1055.

Fisher, E. S., J. P. Bynum and J. S. Skinner (2009). "Slowing the growth of health care costs--lessons from regional variation." N Engl J Med **360**(9): 849-852.

Forrest, C. B., P. A. Nutting, S. von Schrader, C. Rohde and B. Starfield (2006). "Primary care physician specialty referral decision making: patient, physician, and health care system determinants." Med Decis Making **26**(1): 76-85.

Forrest, C. B. and B. Starfield (1996). "The effect of first-contact care with primary care clinicians on ambulatory health care expenditures." J Fam Pract **43**(1): 40-48.

Fortin, M., G. Bravo, C. Hudon, A. Vanasse and L. Lapointe (2005). "Prevalence of multimorbidity among adults seen in family practice." Ann Fam Med **3**(3): 223-228.

Fortin, M., J. Dionne, G. Pinho, J. Gignac, J. Almirall and L. Lapointe (2006). "Randomized controlled trials: do they have external validity for patients with multiple comorbidities?" Ann Fam Med **4**(2): 104-108.

Franks, P., C. M. Clancy and P. A. Nutting (1992). "Gatekeeping revisited--protecting patients from overtreatment." N Engl J Med **327**(6): 424-429.

Franks, P. and K. Fiscella (1998). "Primary care physicians and specialists as personal physicians. Health care expenditures and mortality experience." J Fam Pract **47**(2): 105-109.

Frech, H. E. and M. P. Smith (2015). "Anatomy of a Slow-Motion Health Insurance Death Spiral." North American Actuarial Journal **19**(1): 60-72.

Freeman, G. and P. Hjortdahl (1997). "What future for continuity of care in general practice?" BMJ **314**(7098): 1870-1873.

Gabel, J. R. (1999). "Job-based health insurance, 1977-1998: the accidental system under scrutiny." Health Aff (Millwood) **18**(6): 62-74.

Ge, L. X., R. Ong, C. W. Yap and B. H. Heng (2019). "Effects of chronic diseases on health-related quality of life and self-rated health among three adult age groups." Nursing & Health Sciences **21**(2): 214-222.

Goetzel, R. Z., K. Hawkins, R. J. Ozminkowski and S. H. Wang (2003). "The health and productivity cost burden of the "top 10" physical and mental health conditions affecting six large US employers in 1999." Journal of Occupational and Environmental Medicine **45**(1): 5-14.

Goetzel, R. Z., S. R. Long, R. J. Ozminkowski, K. Hawkins, S. H. Wang and W. Lynch (2004). "Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting US employers." Journal of Occupational and Environmental Medicine **46**(4): 398-412.

Grembowski, D., J. Schaefer, K. E. Johnson, H. Fischer, S. L. Moore, M. Tai-Seale, R. Ricciardi, J. R. Fraser, D. Miller, L. LeRoy and A. M. R. Network (2014). "A conceptual model of the role of complexity in the care of patients with multiple chronic conditions." Med Care **52 Suppl 3**: S7-S14.

Gruneir, A., S. E. Bronskill, C. J. Maxwell, Y. Q. Bai, A. J. Kone, K. Thavorn, Y. Petrosyan, A. Calzavara and W. P. Wodchis (2016). "The association between multimorbidity and hospitalization is modified by individual demographics and physician continuity of care: a retrospective cohort study." Bmc Health Services Research **16**.

Hall, M. A. (2020). "The Effects of Political Versus Actuarial Uncertainty on Insurance Market Stability." Rsf-the Russell Sage Journal of the Social Sciences **6**(2): 223-242.

Hall, M. A., E. Dugan, B. Zheng and A. K. Mishra (2001). "Trust in physicians and medical institutions: what is it, can it be measured, and does it matter?" Milbank Q **79**(4): 613-639, v.

Harrold, L. R., T. S. Field and J. H. Gurwitz (1999). "Knowledge, patterns of care, and outcomes of care for generalists and specialists." J Gen Intern Med **14**(8): 499-511.

HCCI (2018). 2016 Health Care Cost and Utilization Report, Health Care Cost Institute.

HCCI (2019). 2017 Health Care Cost and Utilization Report, Health Care Cost Institute.

Hefner, J. L., R. Wexler and A. S. McAlearney (2015). "Primary care access barriers as reported by nonurgent emergency department users: implications for the US primary care infrastructure." Am J Med Qual **30**(2): 135-140.

HintHealth (2023). "Trends in Direct Primary Care 2022."

IOM (2007). Hospital-based Emergency Care: At the Breaking Point, Institute of Medicine at the National Academies.

Ionescu-Ittu, R., J. McCusker, A. Ciampi, A. M. Vadeboncoeur, D. Roberge, D. Larouche, J. Verdon and R. Pineault (2007). "Continuity of primary care and emergency department utilization among elderly people." CMAJ **177**(11): 1362-1368.

Jones, D. E., K. A. Carson, S. N. Bleich and L. A. Cooper (2012). "Patient trust in physicians and adoption of lifestyle behaviors to control high blood pressure." Patient Educ Couns **89**(1): 57-62.

Jordan, J. E., A. M. Briggs, C. A. Brand and R. H. Osborne (2008). "Enhancing patient engagement in chronic disease self-management support initiatives in Australia: the need for an integrated approach." Med J Aust **189**(S10): S9-S13.

Kellermann, A. L. (2006). "Crisis in the emergency department." N Engl J Med **355**(13): 1300-1303.

Klemes, A., R. E. Seligmann, L. Allen, M. A. Kubica, K. Warth and B. Kaminetsky (2012). "Personalized preventive care leads to significant reductions in hospital utilization." Am J Manag Care **18**(12): e453-460.

Kushnir, T., D. Greenberg, N. Madjar, I. Hadari, Y. Yermiahu and Y. G. Bachner (2014). "Is burnout associated with referral rates among primary care physicians in community clinics?" Fam Pract **31**(1): 44-50.

Landau, D. A., Y. G. Bachner, K. Elishkewitz, L. Goldstein and E. Barneboim (2007). "Patients' views on optimal visit length in primary care." J Med Pract Manage **23**(1): 12-15.

Latham, K. and C. W. Peek (2013). "Self-rated health and morbidity onset among late midlife U.S. adults." J Gerontol B Psychol Sci Soc Sci **68**(1): 107-116.

Lee, D. C., L. Shi, G. Pierre, J. Zhu and R. Hu (2014). "Chronic conditions and medical expenditures among non-institutionalized adults in the United States." Int J Equity Health **13**: 105.

Lorenzoni, L., A. Belloni and F. Sassi (2014). "Health-care expenditure and health policy in the USA versus other high-spending OECD countries." Lancet **384**(9937): 83-92.

Macinko, J., B. Starfield and L. Shi (2003). "The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998." Health Serv Res **38**(3): 831-865.

MACPAC. "Enrollment process for Medicaid managed care." Retrieved November 4, 2021, from https://www.macpac.gov/subtopic/enrollment-process-for-medicaid-managed-care/.

MACPAC. "Provider payment and delivery systems." Retrieved November 4, 2021, from https://www.macpac.gov/medicaid-101/provider-payment-and-delivery-systems/

Marmor, T. and J. Oberlander (2012). "From HMOs to ACOs: the quest for the Holy Grail in U.S. health policy." J Gen Intern Med **27**(9): 1215-1218.

Mehrotra, A., C. B. Forrest and C. Y. Lin (2011). "Dropping the baton: specialty referrals in the United States." Milbank Q **89**(1): 39-68.

Mollborn, S., I. Stepanikova and K. S. Cook (2005). "Delayed care and unmet needs among health care system users: when does fiduciary trust in a physician matter?" Health Serv Res **40**(6 Pt 1): 1898-1917.

Musich, S., A. Klemes, M. A. Kubica, S. Wang and K. Hawkins (2014). "Personalized preventive care reduces healthcare expenditures among Medicare Advantage beneficiaries." Am J Manag Care **20**(8): 613-620.

Musich, S., S. Wang, K. Hawkins and A. Klemes (2016). "The Impact of Personalized Preventive Care on Health Care Quality, Utilization, and Expenditures." Popul Health Manag **19**(6): 389-397.

NAHU. (2018). "Direct Primary Care Overview." from https://neahu.starchapter.com/images/meeting/051718/direct_primary_care_overview___allison_dahl.pdf.

Nextera (2016). DigitalGlobe: A Case Study, Nextera Healthcare.
Oberlander, J. (2011). "Throwing darts: Americans' elusive search for health care cost control." J Health Polit Policy Law **36**(3): 477-484.
Page, L. (2013). "The rise and further rise of concierge medicine." BMJ **347**: f6465.
Peikes, D., E. F. Taylor, A. S. O'Malley and E. C. Rich (2020). "The Changing Landscape Of Primary Care: Effects Of The ACA And Other Efforts Over The Past Decade." Health Aff (Millwood) **39**(3): 421-428.
Pereira Gray, D. J., K. Sidaway-Lee, E. White, A. Thorne and P. H. Evans (2018). "Continuity of care with doctors-a matter of life and death? A systematic review of continuity of care and mortality." BMJ Open **8**(6): e021161.
Pham, H. H., D. Schrag, A. S. O'Malley, B. Wu and P. B. Bach (2007). "Care patterns in Medicare and their implications for pay for performance." N Engl J Med **356**(11): 1130-1139.
Phillips, R. L., Jr., P. A. Pugno, J. W. Saultz, M. L. Tuggy, J. M. Borkan, G. S. Hoekzema, J. E. DeVoe, J. A. Weida, L. E. Peterson, L. S. Hughes, J. E. Kruse and J. C. Puffer (2014). "Health is primary: Family medicine for America's health." Ann Fam Med **12 Suppl 1**: S1-S12.
Rubin, R. (2018). "Is Direct Primary Care a Game Changer?" JAMA **319**(20): 2064-2066.
Shanafelt, T. D., O. Hasan, L. N. Dyrbye, C. Sinsky, D. Satele, J. Sloan and C. P. West (2015). "Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014." Mayo Clin Proc **90**(12): 1600-1613.
Shortell, S. M., T. M. Waters, K. W. Clarke and P. P. Budetti (1998). "Physicians as double agents: maintaining trust in an era of multiple accountabilities." JAMA **280**(12): 1102-1108.
Sinsky, C., L. Colligan, L. Li, M. Prgomet, S. Reynolds, L. Goeders, J. Westbrook, M. Tutty and G. Blike (2016). "Allocation of Physician Time in Ambulatory Practice: A Time and Motion Study in 4 Specialties." Ann Intern Med **165**(11): 753-760.
Sirdeshmukh, D., J. Singh and B. Sabol (2002). "Consumer-trust, value, and loyalty in relational exchanges." Journal of Marketing **66**(1): 15-37.
Stange, K. C. and R. L. Ferrer (2009). "The paradox of primary care." Ann Fam Med **7**(4): 293-299.
Starfield, B. (1994). "Is primary care essential?" Lancet **344**(8930): 1129-1133.
Starfield, B. (1997). "Outcome of acute myocardial infarction according to the specialty of the admitting physician." N Engl J Med **336**(22): 1607; author reply 1608-1609.
Starfield, B., L. Shi, A. Grover and J. Macinko (2005). "The effects of specialist supply on populations' health: Assessing the evidence." Health Affairs **24**(3): W97-W107.
Starfield, B., L. Shi and J. Macinko (2005). "Contribution of primary care to health systems and health." Milbank Q **83**(3): 457-502.
Stewart, W. F., J. A. Ricci, E. Chee, S. R. Hahn and D. Morganstein (2003). "Cost of lost productive work time among US workers with depression." JAMA **289**(23): 3135-3144.
Stewart, W. F., J. A. Ricci, E. Chee, D. Morganstein and R. Lipton (2003). "Lost productive time and cost due to common pain conditions in the US workforce." JAMA **290**(18): 2443-2454.
Tanenbaum, S. J. (2009). "Pay for performance in Medicare: evidentiary irony and the politics of value." J Health Polit Policy Law **34**(5): 717-746.

Thom, D. H., M. A. Hall and L. G. Pawlson (2004). "Measuring patients' trust in physicians when assessing quality of care." Health Aff (Millwood) **23**(4): 124-132.

Trzeciak, S. and E. P. Rivers (2003). "Emergency department overcrowding in the United States: an emerging threat to patient safety and public health." Emerg Med J **20**(5): 402-405.

Tu, H. T. and P. B. Ginsburg (2006). "Losing ground: physician income, 1995-2003." Track Rep(15): 1-8.

Uscher-Pines, L., J. Pines, A. Kellermann, E. Gillen and A. Mehrotra (2013). "Emergency department visits for nonurgent conditions: systematic literature review." Am J Manag Care **19**(1): 47-59.

Valderas, J. M., B. Starfield, C. B. Forrest, B. Sibbald and M. Roland (2009). "Ambulatory care provided by office-based specialists in the United States." Ann Fam Med **7**(2): 104-111.

Wagner, E. H. (1998). "Chronic disease management: what will it take to improve care for chronic illness?" Eff Clin Pract **1**(1): 2-4.

Wagner, E. H., B. T. Austin and M. Von Korff (1996). "Organizing care for patients with chronic illness." Milbank Q **74**(4): 511-544.

Wagner, E. H., S. M. Bennett, B. T. Austin, S. M. Greene, J. K. Schaefer and M. Vonkorff (2005). "Finding common ground: patient-centeredness and evidence-based chronic illness care." J Altern Complement Med **11 Suppl 1**: S7-15.

Chapter 2: Selection

Patient selection, that is, characteristics of patients enrolled in a coverage option, is central to the financing and delivery of health care in the US. As such, it is one of the most fundamental aspects of a health care financing and delivery model that must be understood before results achieved by any new model can be properly understood. Without a rigorous understanding of patient selection, it is not possible to accurately determine whether a financing and delivery model achieves favorable results. Studies must ensure that effects of patient selection are untangled from effects of the model so that accurate conclusions about the model's effects can be formed.

This research examined patient selection in a large employer group which offered two medical benefit plan options to its employees and their dependents. In one plan option, primary care was offered in a Direct Primary Care (DPC) model and all care downstream of primary care (such as specialist visits, urgent care and emergency department visits, and hospital care) was provided with network and other insurance provisions that are typical of employer-provided medical benefits; the other plan option was a typical network-based insurance plan for all levels of care including primary care. Both plans had the same benefits for care downstream of primary care. With DPC, primary care is provided in a membership model and insurance is not used for primary care.

Plan choice is a defining characteristic of health care delivery in the US. The US health care system is characterized by a large variety of insurance plans and coverage options, and plan choice is prevalent among all segments of the US population, whether covered through an employer or other group, a government program or individually. Rather than the government

specifying what plan people must have or simply providing each person with a plan, as in some countries, choice is a defining characteristic of health care delivery in the US.

Plan choice is prevalent in employer-sponsored medical benefits in the US. As of 2018, 55% of the population had employment-based coverage (Berchick E.R. 2018). About 60% of covered employees have choice of health plans (Gabel 1999, Claxton, Rae et al. 2018).Many families in which both adults are employed have coverage options from both employers; the family evaluates plan characteristics such as networks, plan provisions, payroll deductions and out of pocket costs for all options before deciding which plan(s) to use for family members.

Understanding the factors by which patients differentially select health plans is important because selection bias may exist by these factors (Hellinger and Wong 2000). In addition, selection is important in health insurance markets because selection bias can cause financial difficulties for insurance plans (Cutler 1999, Frech and Smith 2015). Patients choose plans differentially based on observable patient characteristics such as age. Younger patients on average have lower health care utilization and spending than older patients, and they are more likely to choose an HMO plan. In contrast, older patients are more likely to choose the fee-for-service FFS plan when they are offered the same two options (Hellinger 1995). This sort of differential choice may cause financial challenges for the plans if they are unable to price according to risk. If patients choose differentially based on characteristics the plan cannot measure, revenue may be inadequate due to enrollees' actual utilization exceeding plan expectations.

This research aimed to determine patient and plan factors that were associated with plan choice in a dual choice employer-sponsored medical benefit offering.

2.1 Literature Review

Direct Primary Care

Direct Primary Care (DPC) is a financing and delivery model in which patients or employers pay directly for care via a membership model; insurance is not used. With a full panel of roughly one-fourth to one-third of the patients of a traditional insurance-based primary care physician (PCP), DPC physicians may have more availability than their traditional counterparts (Alexander, Kurlander et al. 2005, Rowe, Rowe et al. 2017). The median self-pay adult DPC fee was $75 per month in 2020 and the median monthly DPC fee paid by an employer for a family of four in 2021 was $158 (HintHealth 2023). DPC physicians provide unlimited access to a defined set of primary care services, including coordination and navigation services.

DPC models have the potential to improve outcomes for a number of reasons. They do not accept payment from insurance companies or other third-party payers, which frees up their time for patient care and prompts them to more fully embrace an agency/fiduciary role with their customer patients. Elements of the DPC primary care delivery and financing model may be expected to impact selection. For example, patients may choose to receive primary care in a DPC model because it provides better access to primary care, because the direct relationship between doctor and patient allows for a more trusting and personal relationship, or for a number of other reasons. Different patients will choose (or not choose) the DPC option for different reasons, and the reasons will vary by patient characteristics such as demographics, family situation, and expected future health care needs.

While no empirical studies of Direct Primary Care plans have been published, it is likely similar to other plan choice. Regardless of the plan type, research has demonstrated that individuals evaluate plans in a similar fashion (i.e., by comparing plans along dimensions such as financial aspects, benefits, provider choice and convenience, and making a selection according to the weights they assign to these dimensions) (Scanlon, Chernew et al. 1997).

Plans in published studies of patient selection typically differ by how all types of services are provided and reimbursed, while the employee share of premium usually varies between the options (Scanlon, Chernew et al. 1997, Hellinger and Wong 2000). As such, people will choose based on a wide variety of factors, including network, plan design, and financial factors

This review of patient selection focuses on the types of factors that have been shown to be associated with plan choice; the direction and strength of the relationships is not as relevant since patients may weigh factors differently for different choice sets and no published studies include DPC in their choice set. For example, most studies of selection among employer-sponsored plans involve choices between HMO and FFS and/or PPO options (Scanlon, Chernew et al. 1997, Hellinger and Wong 2000). A small number of studies evaluate choices between high deductible health plans (sometimes referred to as consumer directed health plans) and other plans, typically HMOs and/or PPOs (Buchmueller 2009). A comprehensive review concluded that most studies have found that plan choice varies by groups who differ in particular secondary variables, such as age, gender and health status (Scanlon, Chernew et al. 1997). While we can draw some broad conclusions about patient factors that seem to be associated with plan choice, choice is complex, and data and methodological challenges and

gaps in the literature remain. The discussion turns next to selection and how families choose a plan.

Selection: how families choose

First, families choose among options for employer-sponsored medical benefits is examined. Then the results of the selection literature for the constructs and variables that have been shown to be statistically significant for selection of employer-sponsored medical plans are reviewed. Then gaps and methodological problems in the selection literature are summarized.

While the selection literature does not contain studies in which there is choice between DPC and traditional insurance-based primary care delivery, it is likely similar to other plan choice. Research has shown that individuals evaluate plans in a similar manner regardless of the plan type, i.e., by comparing plans along dimensions such as financial aspects, benefits, provider choice and convenience, and making a selection according to the weights they assign to these dimensions (Scanlon, Chernew et al. 1997, Cunningham and Kohn 2000, Parente, Feldman et al. 2004). Numerous studies examined selection in the 1970s and 1980s as HMOs became a more popular option and it was important to understand factors responsible for favorable HMO experience (Hellinger 1987). By the 1980s, it was common for employers to offer choice between HMO and PPO/FFS (Fee-For-Service, also known as indemnity) medical benefit options, and many of the employer offerings included multiple HMO options or multiple PPO/FFS options (Bundorf 2003). Employees chose among plans that differed along many dimensions including financial dimensions (out of pocket and employee share of premium), network dimensions (HMO and PPO/FFS options had different hospitals, physicians and other

providers in their networks) and plan design dimensions (such as pre-existing condition limitations, covered services, and comprehensiveness of benefits). Additionally, characteristics of employees and their families would come into play in their plan choice decision. For example, younger and healthier employees might place less emphasis on certain physicians being in network and more emphasis on financial impacts to them, compared to older employees with medical challenges or health concerns in their family.

With multiple plan options, employee choice of plans quickly becomes complex; plan choice is particularly complex when employees are choosing between options that differ in multiple ways, such as when they are offered both HMO and PPO/FFS options, as they use different networks and have different ways of managing costs (Schram and Sonnemans 2011). HMOs, especially in their early years, used stringent utilization management practices to keep health care spending and premiums low (Langwell 1990). Such practices may not be concerning to young and healthy employees, as they did not expect much need for health care services in the near future, and as they may have less money available for spending on health care, the lower cost of HMOs is attractive to these employees. This is but one example of the importance of patient selection. Broadly speaking, patient characteristics influence plan choice by influencing how patients weigh and evaluate plan characteristics. Different employees will evaluate plan choices differently depending on their health, financial and other circumstances, as well as their attitudes and preferences about health care.

There are numerous factors that may contribute to patient selection, including both plan and patient characteristics. Plan characteristics have been described as primary variables of health plan choice, while patient characteristics are frequently treated as secondary

variables, which link to the weight placed on primary variables in plan choice (Scanlon, Chernew et al. 1997). Plan characteristics that influence choice include both premium and expected out of pocket costs, plan provisions and coverage levels, whether plans offer freedom of choice of physicians and hospitals, whether their current physicians are in network in each plan (Parente, Feldman et al. 2004), and convenience (such as distance to the physician's office, waiting time to get an appointment, and costs of switching to a different plan (Samuelson 1988, Hall, Lemak et al. 2008)).

Different patients will likely evaluate these choices differently. For example, patients with chronic conditions have been shown to choose a plan in which their current physicians are in network, whereas choice of providers has been shown to be less salient for healthier people; a healthy patient will place less weight on the choice of physicians than will a patient with chronic conditions (Hellinger 1995, Cutler, Lincoln et al. 2010). More broadly, patient characteristics influence plan choice by influencing how patients weigh and evaluate plan characteristics. Next is patient characteristics and plan selection.

Patient characteristics and plan selection

Demographic and socio-economic factors

Different patients weigh and value plan characteristics differently by age, sex, race/ethnicity, family size or family coverage level, income, and education level. In a choice situation, older employees and females are more likely to choose the higher premium plan, larger family size and coverage tier that includes children are associated with choosing less expensive plans (Grazier, Richardson et al. 1986, Fowles, Kind et al. 2004, Shin and Moon 2007,

Naessens, Khan et al. 2008). A minority of studies did not show an association between plan choice and sex (Shin and Moon 2007).

When plans offered differ in elements related to delivery of non-primary care services, such as when employees choose between HMO and PPO/FFS options, studies show that age, sex, family coverage tier and health status are associated with plan choice, with younger, healthier, male enrollees, and enrollees electing family coverage tending to select the HMO (Scanlon, Chernew et al. 1997, Nicholson, Bundorf et al. 2004, Shin and Moon 2007). As HMO and PPO options differ by both choice of providers and benefit levels, determining which elements are more salient for plan selection is not a simple matter. However, when plans differ only by elements related to primary care (as in this research), plan selection will be based on these elements, including whether selecting a certain plan requires switching to a new PCP and satisfaction with the current PCP.

Studies find selection by socio-economic factors. For education level, the direction of association may depend on the specific types of plans offered and whether enrollee costs vary between options. When a consumer driven health plan (CDHP) is offered alongside HMO and PPO options, higher education level is associated with choosing the CDHP (Fowles, Kind et al. 2004) and when HMO and non-HMO options are offered together, higher education level is associated with choosing the more expensive non-HMO option (Shin and Moon 2007). Other studies found higher education associated with higher likelihood of choosing the lower premium plan or plan with lower total costs (Juba, Lave et al. 1980, McDevitt, Haviland et al. 2014, Barnes, Karpman et al. 2021). Higher education is associated with higher likelihood of switching to a new plan type (Grazier, Richardson et al. 1986, Lako, Rosenau et al. 2011).

Results regarding plan choice and income or poverty level are mixed, with some reporting an association (Grazier, Richardson et al. 1986, Wouters and Hester 1988, Shin and Moon 2007) and some reporting no association (Cunningham and Kohn 2000, Naessens, Khan et al. 2008). Wide variability in how socioeconomic status is conceptualized, operationalized and measured results in a lack of comparability across studies (Nuru-Jeter, Sarsour et al. 2010). As a demographic variable, race/ethnicity may be more commonly available than SES variables in selection studies. Next, the interplay between race/ethnicity and SES variables is discussed.

Relationships among race/ethnicity and socio-economic status variables in studies of health and health care are complex; race/ethnicity still matters after SES is considered (Gornick 2002, Williams, Priest et al. 2016). Race/ethnicity is often used as a proxy for socio-economic status and the two constructs are strongly associated (Schulman, Rubenstein et al. 1995, Nuru-Jeter, Sarsour et al. 2010, Williams, Priest et al. 2016). Results of plan selection by race/ethnicity are mixed. In one study of selection between a consumer driven health plan (CDHP) and a PPO plan, whites and those with a higher education were more likely to choose the CDHP option (Fowles, Kind et al. 2004). A study of plan switching found that while blacks and Hispanics were less likely than whites to switch plans, blacks were more likely than whites to switch to an HMO when they switched (Cunningham and Kohn 2000). When plan selection involved cost differences, studies found that whites were less sensitive to costs. A study found that blacks were more willing than whites to give up choice to save on costs (Tu and Cunningham 1997). Non-whites were more sensitive than whites to premium and deductible differences between plan choices in another study (Schwartz, Hadler et al. 2013).

While numerous studies examined plan choice by socio-economic factors, it is difficult to draw broad and meaningful conclusions due to the inherent complexity of choice and the wide variety in SES factors studied, details of plan choices, and other study differences such as time period, employer's industry and geographic region.

Health status

Health status has potential implications for plan choice, but research is limited by inconsistencies in measurement. The literature indicates that there is an association between health status and plan choice when health status is operationalized as expenditures or chronic conditions, and there is not an association when health status is operationalized as self-rated health or functional status. Health status may be related to plan choice when patients consider their health concerns when selecting a plan. For example, they may consider benefit levels or specific benefits related to their health needs. Studies have found that HMO enrollment is associated with lower prior year expenditures than PPO or FFS enrollment (Altman, Cutler et al. 1998, Cutler, Lincoln et al. 2010). Findings of plan choice and utilization of specific health care services were mixed depending on the time frame and specific services studied. One study found that people who elected the consumer driven plan had statistically significantly fewer hospitalizations in the prior 12 months (Fowles, Kind et al. 2004) while another found no association between plan choice and the family's average utilization of services in the previous 6 months (Grazier, Richardson et al. 1986).

Health status measures related to chronic conditions have been operationalized in various ways, including the number of chronic conditions, presence of any chronic conditions in the family, and currently under care for a chronic condition. Most studies found an association

between chronic conditions and plan choice. Two studies found more chronic conditions or presence of any chronic conditions in the family to be associated with selecting the higher premium plan (Shin and Moon 2007, Naessens, Khan et al. 2008) and one found no association between plan choice and the number of chronic conditions or currently being under care for a chronic condition (Grazier, Richardson et al. 1986). One study found that those who chose the consumer driven plan were statistically significantly less likely to currently be under care for a chronic condition (Fowles, Kind et al. 2004).

Self-rated health is a frequently used measure of health that captures both overall well-being and potentially more specific health conditions. Results of plan choice and self-rated health are mixed. Two studies found no association between plan choice and perceived health status, physical health status or mental health status (Grazier, Richardson et al. 1986, Shin and Moon 2007). One study found an association between better functional health status and choosing the consumer driven plan (Fowles, Kind et al. 2004) and another found an association between choosing the HMO plan and three of six types of functional limitations (Shin and Moon 2007).

Usual source of care

Having a usual source of care (USC) generally means the patient has an ongoing relationship or repeated visits with the same primary care provider over a period of time. Having a USC may reflect the patient's preferred way of interacting with the health care system as well as satisfaction with the usual provider and depending on how it is operationalized, USC may reflect utilization of a certain type of health care service. In particular, not having a USC might indicate the patient has switched usual providers because of dissatisfaction or some

other reason, or may indicate that the patient does not have much utilization of the type of provider that would be considered a USC. USC may be determined by patient survey, often the Medical Expenditure Panel Survey (Kirby and Yabroff 2020); it may also be defined using claims data.

In studies in which switching to a different plan would necessitate switching providers, having a usual source of care or attachment to the physician had the strongest influence on whether people stayed or switched (Grazier, Richardson et al. 1986, Hellinger 1987). Additionally, patients with chronic conditions or actively receiving care were less likely to switch plans than healthy patients, particularly when switching plans necessitated switching providers (Hellinger 1995, Schlesinger, Druss et al. 1999, Cutler, Lincoln et al. 2010). The literature seems to indicate that the interplay between having a usual source of care and having a chronic condition is important for plan selection.

Other patient factors

Demographic, socio-economic and usual source of care variables do not fully explain plan choice. Similar enrollees select different options due to factors such as risk appetite, willingness to pay for care, propensity to consume care, and other preferences and attitudes. Variation in the intrinsic preferences of consumers is present whenever there is choice. Plan characteristics and selection are discussed next.

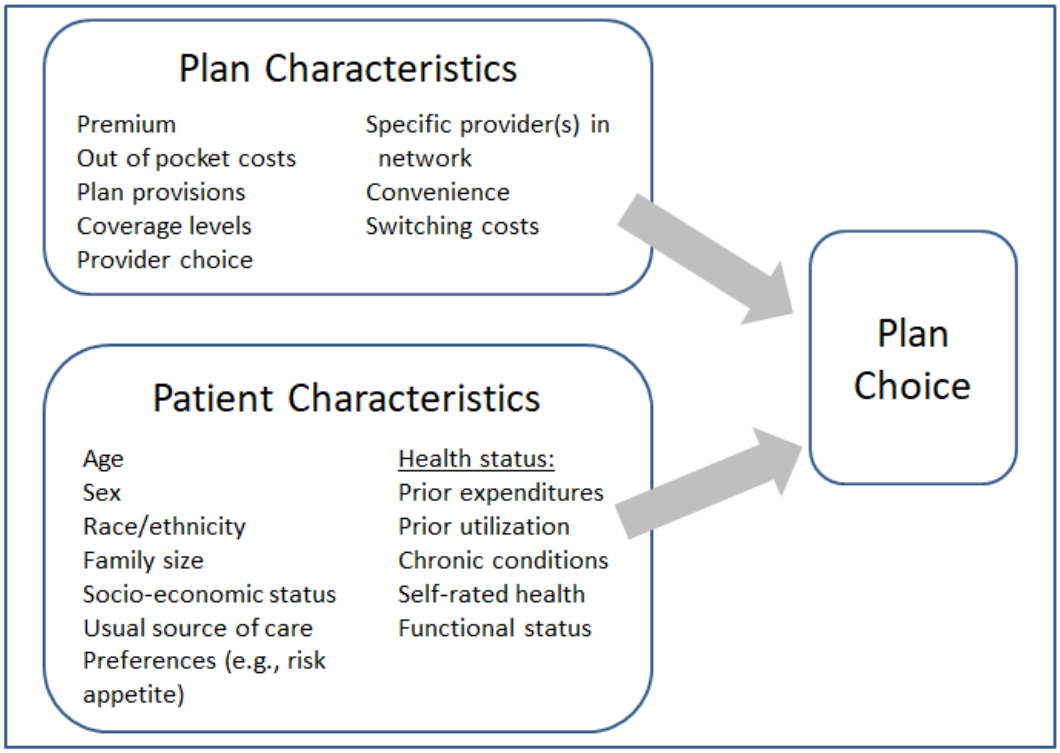
Plan characteristics and selection

A number of plan characteristics have been studied in the selection literature. In a synthesis of selection studies, almost all found price (premium and/or out of pocket costs paid by the patient) to have a statistically significant negative effect on the probability of enrolling in

a health plan (Scanlon, Chernew et al. 1997). Questions of benefit richness are often confounded with questions of provider choice, as HMOs differ from PPO and FFS plans in both ways; as such, it is difficult to determine whether plan choice is driven more by benefit generosity or freedom to choose one's providers. Some studies found that the inclusion of certain benefits (preventative care (Feldman, Finch et al. 1989), mental health services (Deb, Wilcox-Gok et al. 1996) or maternity care (Robinson, Gardner et al. 1993)) were associated with plan choice.

In summary, the selection literature and the literature on models of health care utilization indicate that demographic, chronic condition, and usual source of care variables are relevant for health plan selection. Figure 2.1 illustrates my conceptual model of factors relevant for patient selection in this research.

Figure 2.1 Conceptual Model of Plan Choice



Data and methodological challenges and gaps in the literature

Early research on patient selection was restricted by conceptual and methodological limitations. Historically, health insurance plan choice was viewed as a matter of financial protection and patients were believed to choose based on a combination of risk aversion and wealth (Klinkman 1991). This view was predominant through the 1980s when fee for service (FFS, i.e., indemnity) plans were prevalent. As HMOs began to be offered as an option alongside FFS plans, choice began to be viewed differently by researchers (Scanlon, Chernew et al. 1997). No longer simply a financial decision, the addition of HMOs brought networks and health care delivery approaches into the choice, as HMOs restricted physician choice while FFS plans did not. Plan choice was then conceptualized by researchers as patient maximization of utility,

where one's utility could involve myriad factors from financial to network and health care delivery elements, among others (Klinkman 1991). When patients chose among HMOs and FFS plans, plan choice was seen as depending on both plan characteristics and patient characteristics. However, researchers tended to assume that all patients with a given set of demographic characteristics would view a given set of plans the same way and make the same choice (Feldman, Finch et al. 1989). That is, studies did not allow for heterogeneous patient preferences outside of characteristics like demographic and socio-economic factors.

Early selection studies were also limited by assumptions in statistical models. For example, while studies have frequently used logit or probit regression to determine plan and patient characteristics associated with plan choice, these characteristics were typically entered as regressors in one-stage models (Scanlon, Chernew et al. 1997). This approach essentially assumed that each plan characteristic was independent of one another; no other relationships between plans or plan characteristics were considered. Such a simple model failed to address complexities such as choice being made sequentially. Additionally, patient factors that are difficult to observe, such as propensity to consume health care and willingness to pay for health care were frequently overlooked or challenging to include in models. Ignoring such unobservable factors meant estimates of modeled factors were likely to be biased. Yet, the inclusion of selection correction procedures has continued to improve estimates of the impact of observable factors on plan selection by correcting for the bias from non-random plan selection due to unobservables (Heckman 1979).

Similarly, a nested choice model (nested logit) was an innovation that allowed for the examination of more nuanced sequential choice behavior than previous models (Feldman,

Finch et al. 1989). Research found that patients evaluated plan choices in light of the entire choice set, grouping similar plans together in the choice process. Patients first identified plan preferences by physician choice, and chose among plans that offered (or did not offer) physician choice (Feldman, Finch et al. 1989). As such, physician choice appears to determine the groups or "nests" of similar plans from which the patient ultimately chooses once the "nest" choice is made.

Two additional methodological improvements have informed current approaches. First, Abramson et al. (1998) considered how methods used by market researchers may advance the study of health plan selection. Market researchers use random effects models to allow for individual consumer brand preferences that are not correlated with observable demographic and socio-economic factors. Random effects approaches were found to better account for unobserved heterogeneity in health plan choice than logistic modeling techniques, unless data on prior plan choice was available (Abramson, Buchmueller et al. 1998). Second, Shin and Moon (2007) attributed favorable selection into HMOs to unobservable individual patient factors rather than health risk factors, using the endogeneity correction developed by Vella (Vella 1993). Like Heckman, Shin employed a statistical technique to improve the estimates of the relationships between observable patient factors and plan choice. Taken together, continued efforts to understand how patients select into health plans remains a conceptual and methodological challenge. But advances in selection models continue to allow for a more refined understanding of the importance of consumer choice in health care and subsequent health care costs.

The majority of relevant studies are now more than twenty years old with limited applicability to current trends (Hellinger 1995, Scanlon, Chernew et al. 1997, Hellinger and Wong 2000). Numerous studies of patient selection were done in the 1980s and 1990s but there is a relative paucity of studies of patient selection of employer-sponsored plans in more recent years. Yet, new trends suggest a need for new research. For example, FFS coverage in employer-sponsored health insurance has dropped from 71% in 1988 to 14% in 1998 to 1% in 2019 (Gabel, Ginsburg et al. 2000, Claxton 2019). Not only do the choice sets faced by today's enrollees differ from those studied in the 1980s and 1990s, people today are likely to have a more sophisticated understanding of how managed care plans work, as they have had many more years of experience with them (Draper, Hurley et al. 2002), and their understanding probably affects how they evaluate health plan choices.

Empirical and methodological challenges of published studies suggest the further need for current research that address the following: 1) reducing assumptions that all enrollees choose rationally with the same preferences (i.e., the same utility function) (Ellis 1989, Feldman, Finch et al. 1989), or otherwise failing to allow for consumer variation in intrinsic preferences for plan choice and sensitivity to plan characteristics (Abramson, Buchmueller et al. 1998); 2) further incorporation of financial factors (such as relative cost of options) as a factor in plan choice (Hellinger 1987, Marquis 1992); 3) identifying the sequential ordering of plan choice and physician choice (Berki and Ashcraft 1980, Klinkman 1991); 4) identifying all other plan choices that are available rather than assuming the probability of choosing a specific plan is independent of the choice set (Merrill, Jackson et al. 1985, Feldman, Finch et al. 1989); 5) moving beyond single-equation multivariate methods to address indirect or sequential

influences in the consumer choice process (Klinkman 1991); and 6) considering the interactions of important primary and secondary variables (Scanlon, Chernew et al. 1997).

While some broad conclusions about patient factors that seem to be associated with plan choice can be drawn, choice is complex, and data and methodological challenges and gaps in the literature remain. No studies of patient selection with a DPC option have been published in the scholarly literature. A thorough literature review revealed no selection studies that examined options that differ only in elements related to primary care. Most choice sets include options that differ by financial elements such as out of pocket payments and share of premium paid by the enrollee. For these reasons, published studies may fail to reveal how patient selection varies between employer-sponsored options that differ only in primary care elements and do not differ in financial impact to the enrollee.

2.2 Data and Methodology

Data for this study came from a large employer group, a county in North Carolina, that started offering a Direct Primary Care health benefit option for the plan year that began on July 1, 2015. Nearly 1,000 employees made a health benefit election for the 2015 plan year. Before the DPC option was added to the group's benefit offering, one plan was offered and that plan (which will be referred to as the Standard plan) has continued to be offered unchanged. Both the DPC and the Standard options have the same benefits for non-primary care services and the employee portion of premium does not vary by plan. As such, plan characteristics that employees are considering for plan choice are a small number of characteristics related to primary care delivery. The DPC option and the Standard option are the same for elements related to non-primary care services and for financial elements such as premiums and out of pocket costs.

For employee-only coverage the Standard plan is $750 HRA, $750 deductible, 20% coinsurance. In the DPC plan, the $750 HRA is replaced by primary care provided at a dedicated DPC clinic located near the group's office. DPC fees are paid by the group, and there is no deductible.

Advantages of this data include 1) as a natural experiment, it represents plan choice in the real world, 2) having data for approximately 2,000 employees and dependents enhances the validity and reliability of the findings, and 3) benefits and employee share of premiums being the same in both plans means that plan choice was focused on primary care-related factors, which improves the accuracy of the patient selection findings as selection won't be conflated by presence of other factors.

Analytic Method

Analysis was done at the family level. Descriptive statistics (chi-square tests) were used to examine the distributions of all independent variables and pairs of independent variables. Associations between plan type and the independent family / enrollee variables were explored using multivariate logistic regression, with all variables entered into the model simultaneously. An interaction term for enrollee age and sex was included as patterns of expenditures and health care utilization by age differ by sex (AHRQ 2020), which was likely to affect plan type selected. Non-statistically significant variables were removed from the regression model, and marginal effects were calculated for the reduced model.

Dependent variable

The dependent variable was *plan type,* coded as either DPC or Standard plan as elected for the plan year beginning July 1, 2015.

Independent variables

As plan choice was made at the family level (spouses and children may not be on a different plan than the employee), analysis was conducted at the family level to the extent allowed by available variables. Family level variables included family *coverage tier*, family *usual source of care*, total *number of chronic conditions* in the family (0, 1, or 2 or more); presence of *specific chronic conditions* were also family level variables. Employee level variables were used when family level variables were not available. Employee level variables were used for *enrollee age*, *enrollee sex*, and *enrollee race/ethnicity*.

Family coverage tier options were included as a categorical variable coded as Employee only, Employee plus spouse or domestic partner, Employee plus child(ren), and Employee plus spouse or domestic partner and child(ren). This four-tier coverage structure was abbreviated EE only / EE + SP / EE + CH / Full Family.

A family was defined as having a usual source of care (USC) if any family member saw the same primary care provider more than once in the pre-period. This is consistent with other studies (Kirby and Yabroff 2020) and with the definition of USC that is part of the concept of continuity of care (Barker, Steventon et al. 2017). USC could take on values 0 or 1.

Chronic conditions are illnesses and impairments that are expected to last a year or more, limit what one can do, and/or may require ongoing medical care (Anderson 2010). The chronic condition grouper list developed by the Office of the Assistant Secretary for Health (OASH) was used. The list identifies groups of clinically related conditions that meet the definition of chronicity, are prevalent, and are potentially amenable to public health or clinical intervention or both (Goodman, Posner et al. 2013). The OASH list was appropriate for this

study as it was a small list of the most serious common condition groups, which were those most likely to affect plan choice (Shin and Moon 2007, Naessens, Khan et al. 2008). A systematic review that aimed to identify and evaluate measures of multi-morbidity suitable for research in primary care and community populations concluded that simple counts of diseases or medications perform almost as well as more complex measures in predicting most outcomes (Huntley, Johnson et al. 2012). Chronic conditions were examined in two different ways, the total number of chronic conditions on the OASH list that were present in the family (values 0, 1, 2 or more), and the presence of each condition in the family, for chronic conditions on the OASH list that were at least minimally present in the sample population. The model included either the total number of chronic conditions or variables for specific conditions, not both. Given that the OASH list was developed for use with patients of any age and the sample population was a younger and presumably healthier population (Anderson 2010) than a general population, there may have been groups of conditions on the OASH list that were not present or only minimally present in the sample population; such groups were excluded to preserve the credibility of the analysis. Specific chronic condition variables were included for those conditions present in at least 2% of the individuals.

Enrollee age as of July 1 2015 was dichotomized as <45 and 45+ years old to create categories of roughly equal size. Enrollee race/ethnicity could take on the values B, W, H and O in the source data (black, white, Hispanic and other). Due to a small number of enrollees of other race/ethnicity, it was combined with the next largest category, H. Race/ethnicity in the data analyzed could take on values B, W and O.

2.3 Results

In total, 936 families made a plan selection for the plan year starting July 1, 2015; 618 selected the Standard option and 318 selected the DPC option. Univariate distributions of enrollee variables by plan choice are shown in Table 2.1. Chi-square tests were performed. Only those specific chronic conditions present in at least 2% of the sample population are shown in Table 2.1. The 2% credibility threshold was met by *arthritis, COPD, depression, diabetes, hyperlipidemia* and *hypertension* (see Table 2.3 for portion of members with each chronic condition).

Distributions were statistically significantly different for DPC and Standard enrollees at the 10% significance level for age, race/ethnicity, usual source of care, coverage tier, number of chronic conditions, hyperlipidemia and hypertension. DPC was statistically significantly more likely to be selected by enrollees who were younger, without a usual source of care in the family, other race/ethnicity, and without any chronic conditions in the family; the Standard plan was statistically significantly more likely to be chosen by enrollees in the EE+SP rate tier (employee and spouse), black enrollees, and those with hyperlipidemia or hypertension in the family.

Chronic conditions were examined in two ways. Each of the six credible conditions was examined separately, providing insights specific to conditions. Another variable, number of chronic conditions, was a measure of multi-morbidity; it was defined as the sum of chronic conditions in the family and could take on the values 0, 1, and two or more. All fifteen of the OASH chronic conditions were included in the multi-morbidity variable (total number of CCs). Number of chronic conditions was highly statistically significant in the univariate analysis and

families with no CCs were much more likely to select DPC; families with any CCs preferred the Standard plan.

At this point there were two models which differed in chronic condition variables. Using the variance inflation factor, multicollinearity was not a concern in the model with total number of chronic conditions. The largest variance inflation factor was 3.23. As all values were below 5.0, collinearity was not severe enough to warrant corrective measures. In the model with multiple variables that represent health status, namely hyperlipidemia and hypertension, these variables were highly associated, with p-value<0.0005 in the chi-square test. It is not desirable for variables representing the same construct to be highly associated (Fowles, Kind et al. 2004). Additionally, only two of the six chronic conditions were represented in the model with hyperlipidemia and hypertension. In the model with total number of CCs, all fifteen OASH conditions were used to define the CC variable. In that sense, the total number of chronic conditions variable was a broader representation of the effect of CCs (and of multi-morbidity) than was the inclusion of only two of the specific CC variables. For these reasons, the model with hyperlipidemia and hypertension was not considered further; the logistic regression analysis was run on the model with the total number of chronic conditions.

Table 2.1 Univariate Distributions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Age	45 +	0.551	0.465	0.595	
	< 45	0.449	0.535	0.405	0.0002
Sex	F	0.545	0.531	0.552	
	M	0.455	0.469	0.448	0.5541
Race/ethnicity	Black	0.101	0.072	0.117	
	White	0.840	0.849	0.835	
	Other	0.059	0.079	0.049	0.0258
USC	No	0.163	0.292	0.097	
	Yes	0.837	0.708	0.903	<.0001
Coverage Tier	EE+CH	0.237	0.248	0.231	
	EE+SP	0.098	0.060	0.118	
	EE only	0.527	0.547	0.516	
	Full Fam	0.138	0.145	0.134	0.0443
Number of CCs	0	0.533	0.642	0.477	
	1	0.295	0.245	0.320	
	2+	0.172	0.113	0.202	<.0001
Arthritis	No	0.932	0.947	0.924	
	Yes	0.068	0.053	0.076	0.1946
COPD	No	0.926	0.934	0.922	
	Yes	0.074	0.066	0.078	0.5189
Depression	No	0.935	0.943	0.930	
	Yes	0.065	0.057	0.070	0.4462
Diabetes	No	0.949	0.956	0.945	
	Yes	0.051	0.044	0.055	0.4703
Hyperlipidemia	No	0.840	0.915	0.801	
	Yes	0.160	0.085	0.199	<.0001
Hypertension	No	0.794	0.858	0.761	
	Yes	0.206	0.142	0.239	0.0004
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Bivariate distributions for demographics and USC

In this section pairs of demographic and USC variables were examined to determine whether patterns are consistent with results from the univariate analysis. The chi-square test offers a way to examine plan choice by pairs of variables; Fisher's exact test was used when the chi-square test was invalid due to small cells. P-values are not shown in the table if the chi-

square test was invalid due to small cells and Fisher's exact test was not feasible as the number of calculations needed was beyond system capabilities.

Bivariate results for demographic and USC variables are shown in Table 2.2. Many of the bivariate tables show results that were statistically significant and expected, given the results of each independent variable separately (Table 2.1). For example, in Table 2.1 age was statistically significant and sex was not; in Table 2.2, age and sex were statistically significant and younger enrollees were more likely to choose DPC regardless of sex and older enrollees were less likely to choose DPC regardless of sex. That is, plan choice was influenced by age but not sex. Similarly, plan choice by sex and USC is consistent with univariate results that sex was not statistically significant and USC was statistically significant. Enrollees without a USC in the family were more likely to choose DPC and those with a USC were more likely to choose the Standard plan, regardless of sex. Bivariate plan choice was not statistically significant for sex and race/ethnicity.

Plan choice by race/ethnicity in Table 2.1 shows that black enrollees were much more likely to choose the Standard plan, other race/ethnicity enrollees were much more likely to choose DPC, and white enrollees were slightly more likely to choose the Standard plan. Bivariate plan choice by age and race/ethnicity shows that race/ethnicity was the dominant characteristic for black enrollees; they were more likely to choose the Standard plan regardless of age. For white and other enrollees, older enrollees were more likely to choose the Standard plan and younger enrollees were more likely to choose DPC. That is, for white and other enrollees, plan choice was influenced more by age than race/ethnicity.

Age and coverage tier were both statistically significant in the univariate plan choice results. Enrollees in the Full Family tier exhibited an unexpected bivariate result by age; older Full Family enrollees were more likely to choose DPC while younger Full Family enrollees were more likely to choose the Standard plan. For the other tiers, older enrollees were more likely to choose the Standard plan and younger enrollees were more likely to choose DPC, consistent with univariate results for age. The bivariate results for age and coverage tier suggested a reason why EE+SP tier (employee plus spouse) was more likely to choose the Standard plan while the other tiers were more likely to choose DPC. Table 2.2 shows that EE+SP enrollees were older than enrollees in the other tiers; 78% of EE+SP enrollees were older while EE+CH (employee plus child(ren)), EE only and Full Family were 47%, 58% and 43% older, respectively.

Age and USC were both highly statistically significant in the univariate analysis with p values of 0.0002 and <0.0001, respectively. Younger enrollees and enrollees without a USC in the family were much more likely to choose DPC. In the bivariate table, younger enrollees without a USC, as expected, were more likely to choose DPC and older enrollees with a USC were more likely to select the Standard plan. The two independent variables acted in opposite directions for younger enrollees with a USC and older enrollees without a USC. For younger enrollees with a USC, DPC and Standard plans were selected at about the same rate. For older enrollees without a USC, plan choice was influenced more by the effect of USC than age; enrollees without a USC were more likely to choose DPC despite their older age.

Bivariate plan choice by race/ethnicity and USC showed that race/ethnicity influenced choice more than other factors for black enrollees; they were more likely to choose the Standard plan regardless of USC. Choice for enrollees of other race/ethnicity was also

influenced more by race/ethnicity; they were more likely to choose DPC regardless of USC. White enrollees' choice was influenced more by USC; enrollees without a USC preferred DPC and those with a USC preferred the Standard plan.

Table 2.2 Bivariate Distributions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Age & Sex	45 + | F	0.318	0.248	0.354	
	45 + | M	0.233	0.217	0.241	
	< 45 | F	0.226	0.283	0.197	
	< 45 | M	0.222	0.252	0.207	0.0009
Age & Race/Ethnicity	45 + | B	0.051	0.031	0.061	
	45 + | O	0.028	0.022	0.031	
	45 + | W	0.472	0.412	0.503	
	< 45 | B	0.050	0.041	0.055	
	< 45 | O	0.031	0.057	0.018	
	< 45 | W	0.368	0.437	0.332	0.0001
Age & Coverage Tier	45 + | EE + CH	0.112	0.107	0.115	
	45 + | EE + SP	0.076	0.038	0.095	
	45 + | EE only	0.304	0.248	0.333	
	45 + | FullFam	0.059	0.072	0.052	
	< 45 | EE + CH	0.125	0.142	0.117	
	< 45 | EE + SP	0.022	0.022	0.023	
	< 45 | EE only	0.222	0.299	0.183	
	< 45 | FullFam	0.079	0.072	0.083	0.0001
Age & USC	45 + | no	0.054	0.094	0.034	
	45 + | yes	0.497	0.371	0.561	
	< 45 | no	0.109	0.198	0.063	
	< 45 | yes	0.340	0.336	0.341	<.0001
Sex & Race/Ethnicity	F | B	0.080	0.053	0.094	
	F | O	0.051	0.069	0.042	
	F | W	0.413	0.409	0.416	
	M | B	0.021	0.019	0.023	
	M | O	0.007	0.009	0.006	
	M | W	0.426	0.440	0.419	0.1609
Sex & Coverage Tier	F | EE + CH	0.115	0.129	0.108	
	F | EE + SP	0.050	0.038	0.057	
	F | EE only	0.327	0.311	0.335	
	F | FullFam	0.052	0.053	0.052	
	M | EE + CH	0.122	0.119	0.123	
	M | EE + SP	0.048	0.022	0.061	
	M | EE only	0.200	0.236	0.181	
	M | FullFam	0.085	0.091	0.083	0.0778
Sex & USC	F | no	0.082	0.148	0.049	
	F | yes	0.463	0.384	0.503	
	M | no	0.081	0.145	0.049	
	M | yes	0.374	0.324	0.400	<.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.2 (continued) Bivariate Distributions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Race/Ethnicity &	B | EE + CH	0.019	0.016	0.021	
Coverage Tier	B | EE + SP	0.001	0.003	0.000	
	B | EE only	0.068	0.047	0.079	
	B | FullFam	0.013	0.006	0.016	
	O | EE + CH	0.016	0.019	0.015	
	O | EE + SP	0.007	0.006	0.008	
	O | EE only	0.031	0.047	0.023	
	O | FullFam	0.004	0.006	0.003	
	W | EE + CH	0.202	0.214	0.196	
	W | EE + SP	0.090	0.050	0.110	
	W | EE only	0.427	0.453	0.414	
	W | FullFam	0.121	0.132	0.115	
Race/Ethnicity & USC	B | no	0.018	0.022	0.016	
	B | yes	0.083	0.050	0.100	
	O | no	0.011	0.025	0.003	
	O | yes	0.048	0.053	0.045	
	W | no	0.135	0.245	0.078	
	W | yes	0.705	0.604	0.757	<.0001
Coverage Tier & USC	EE + CH | no	0.015	0.031	0.006	
	EE + CH | yes	0.222	0.217	0.225	
	EE + SP | no	0.007	0.016	0.003	
	EE + SP | yes	0.091	0.044	0.115	
	EE only | no	0.130	0.220	0.084	
	EE only | yes	0.396	0.327	0.432	
	FullFam | no	0.011	0.025	0.003	
	FullFam | yes	0.127	0.119	0.131	
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.3 Chronic Condition Member Distributions

Chronic Condition	
Arrhythmias	0.005
Arthritis	0.033
Asthma	0.006
Cancer	0.008
Chronic kidney disease	0.011
Chronic obstructive pulmonary disease	0.036
Congestive heart failure	0.002
Coronary artery disease	0.010
Dementia	0.000
Depression	0.033
Diabetes	0.025
Hyperlipidemia	0.083
Hypertension	0.107
Osteoporosis	0.001
Stroke	0.006
Total N (%)	1,973 (100%)

Bivariate distributions with chronic conditions

In this section chronic conditions were examined in conjunction with demographic variables to determine whether patterns were consistent with results from the univariate analysis. The chi-square test offered a way to examine plan choice by pairs of variables; Fisher's exact test was used when the chi-square test was invalid due to small cells. Tables 2.4 through 2.13 show enrollees in bivariate categories of a demographic variable and a chronic condition. P-values are not shown in the tables if the chi-square test was invalid due to small cells and Fisher's exact test was not feasible to run.

Plan choice by age was highly statistically significant (p=0.0002). Plan choice by bivariate categories of age and each chronic condition were statistically significant for all CCs (see Table 2.4). For arthritis and COPD, plan choice seemed to be influenced more by age than chronic

condition; regardless of the presence of the chronic condition, older enrollees preferred the Standard plan and younger enrollees preferred DPC. For the four other chronic conditions (depression, diabetes, hyperlipidemia and hypertension), older enrollees preferred the Standard plan regardless of the presence of the condition. However, younger enrollees with the condition preferred the Standard plan while younger enrollees without preferred DPC. Table 2.5 shows that chronic conditions were more influential than age when the two variables have the opposite influence. Older enrollees without any CCs preferred DPC and younger enrollees with CCs preferred the Standard plan.

Plan choice by sex was not statistically significant. Regardless of sex, enrollees with any CCs preferred the Standard plan and enrollees without preferred DPC.

Plan choice by race/ethnicity was statistically significant with p=0.0258. Other and white enrollees chose the plan that was consistent with the number of chronic conditions. However, black enrollees without chronic conditions preferred the Standard plan, contrary to what is expected based on the number of chronic conditions alone. That is, for black enrollees, race/ethnicity influenced plan choice more than chronic conditions.

Plan choice by coverage tier was statistically significant with p=0.0443. The direction of plan preference for all combinations of coverage tier and number of chronic conditions was as expected based on the number of chronic conditions with one exception. Enrollees in tier EE+SP without CCs slightly preferred the Standard plan.

Plan choice by usual source of care was highly statistically significant (p<0.0001). All tests were highly statistically significant for bivariate combinations of USC and a chronic condition (p<0.0001). Regardless of whether conditions were present or not, respondents with

a USC preferred the Standard plan and respondents without preferred DPC. There was one exception in a very small cell.

Bivariate combinations of chronic condition and coverage tier were statistically significant and had a valid test only for hyperlipidemia and hypertension. All combinations were influenced more by chronic condition except EE+SP tier without the condition. For both hyperlipidemia and hypertension, EE+SP enrollees without the condition preferred the Standard plan; based only on not having the CC, we would expect them to have preferred DPC.

Table 2.4 Bivariate Distributions, Age and Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Arthritis	45 + | no	0.494	0.428	0.528	
	45 + | yes	0.058	0.038	0.068	
	< 45 | no	0.438	0.519	0.396	
	< 45 | yes	0.011	0.016	0.008	0.0012
COPD	45 + | no	0.510	0.440	0.545	
	45 + | yes	0.042	0.025	0.050	
	< 45 | no	0.417	0.494	0.377	
	< 45 | yes	0.032	0.041	0.028	0.0013
Depression	45 + | no	0.514	0.434	0.555	
	45 + | yes	0.037	0.031	0.040	
	< 45 | no	0.421	0.509	0.375	
	< 45 | yes	0.028	0.025	0.029	0.0014
Diabetes	45 + | no	0.514	0.434	0.555	
	45 + | yes	0.037	0.031	0.040	
	< 45 | no	0.435	0.522	0.390	
	< 45 | yes	0.014	0.013	0.015	0.0019
Hyperlipidemia	45 + | no	0.423	0.399	0.435	
	45 + | yes	0.128	0.066	0.160	
	< 45 | no	0.417	0.516	0.366	
	< 45 | yes	0.032	0.019	0.039	<0.0001
Hypertension	45 + | no	0.385	0.352	0.401	
	45 + | yes	0.167	0.113	0.194	
	< 45 | no	0.409	0.506	0.359	
	< 45 | yes	0.040	0.028	0.045	<0.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.5 Bivariate Distributions, Age and Number of Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
	45 + | 0	0.215	0.230	0.207	
	45 + | 1	0.196	0.148	0.220	
	45 + | 2+	0.141	0.088	0.168	
	< 45 | 0	0.318	0.412	0.270	
	< 45 | 1	0.099	0.097	0.100	
	< 45 | 2+	0.031	0.025	0.034	<0.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.6 Bivariate Distributions, Sex and Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Arthritis	F | no	0.506	0.509	0.505	
	F | yes	0.038	0.022	0.047	
	M | no	0.425	0.437	0.419	
	M | yes	0.030	0.031	0.029	0.3087
COPD	F | no	0.512	0.500	0.518	
	F | yes	0.033	0.031	0.034	
	M | no	0.415	0.434	0.405	
	M | yes	0.041	0.035	0.044	0.7922
Depression	F | no	0.506	0.497	0.511	
	F | yes	0.038	0.035	0.040	
	M | no	0.428	0.447	0.419	
	M | yes	0.027	0.022	0.029	0.7912
Hypertension	F | no	0.522	0.513	0.528	
	F | yes	0.022	0.019	0.024	
	M | no	0.426	0.443	0.417	
	M | yes	0.029	0.025	0.031	0.8204
Hyperlipidemia	F | no	0.468	0.497	0.453	
	F | yes	0.077	0.035	0.099	
	M | no	0.372	0.418	0.348	
	M | yes	0.083	0.050	0.100	<0.0001
Hypertension	F | no	0.435	0.478	0.413	
	F | yes	0.110	0.053	0.139	
	M | no	0.359	0.381	0.348	
	M | yes	0.096	0.088	0.100	0.0007
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.7 Bivariate Distributions, Sex and Number of Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
	F | 0	0.303	0.371	0.269	
	F | 1	0.154	0.116	0.173	
	F | 2+	0.088	0.044	0.110	
	M | 0	0.230	0.270	0.209	
	M | 1	0.141	0.129	0.147	
	M | 2+	0.084	0.069	0.092	<0.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.8 Bivariate Distributions, Race/Ethnicity and Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Arthritis	B | no	0.095	0.069	0.108	
	B | yes	0.006	0.003	0.008	
	O | no	0.057	0.075	0.047	
	O | yes	0.002	0.003	0.002	
	W | no	0.780	0.802	0.769	
	W | yes	0.060	0.047	0.066	0.083
COPD	B | no	0.094	0.063	0.110	
	B | yes	0.007	0.009	0.006	
	O | no	0.056	0.079	0.044	
	O | yes	0.003	0.000	0.005	
	W | no	0.777	0.792	0.769	
	W | yes	0.063	0.057	0.066	0.033
Depression	B | no	0.096	0.069	0.110	
	B | yes	0.005	0.003	0.006	
	O | no	0.054	0.075	0.044	
	O | yes	0.004	0.003	0.005	
	W | no	0.784	0.799	0.777	
	W | yes	0.056	0.050	0.058	0.121
Diabetes	B | no	0.098	0.072	0.112	
	B | yes	0.003	0.000	0.005	
	O | no	0.059	0.079	0.049	
	W | no	0.792	0.805	0.785	
	W | yes	0.048	0.044	0.050	0.085
Hyperlipidemia	B | no	0.092	0.066	0.105	
	B | yes	0.010	0.006	0.011	
	O | no	0.051	0.075	0.039	
	O | yes	0.007	0.003	0.010	
	W | no	0.697	0.774	0.657	
	W | yes	0.143	0.075	0.178	<0.0001
Hypertension	B | no	0.066	0.050	0.074	
	B | yes	0.035	0.022	0.042	
	O | no	0.048	0.072	0.036	
	O | yes	0.011	0.006	0.013	
	W | no	0.679	0.736	0.650	
	W | yes	0.160	0.113	0.184	0.0013
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.9 Bivariate Distributions, Race/Ethnicity and Number of Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
	B | 0	0.049	0.041	0.053	
	B | 1	0.032	0.019	0.039	
	B | 2+	0.020	0.013		
				0.024	
	O | 0	0.035	0.060	0.023	
	O | 1	0.017	0.016	0.018	
	O | 2+	0.006	0.003	0.008	
	W | 0	0.449	0.541	0.401	
	W | 1	0.246	0.211	0.264	
	W | 2+	0.145	0.097	0.170	<0.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.10 Bivariate Distributions, Coverage Tier and Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Arthritis	EE + CH | no	0.225	0.239	0.218	
	EE + CH | yes	0.012	0.009	0.013	
	EE + SP | no	0.081	0.050	0.097	
	EE + SP | yes	0.017	0.009	0.021	
	EE only | no	0.494	0.516	0.482	
	EE only | yes	0.033	0.031	0.034	
	FullFam | no	0.131	0.142	0.126	
	FullFam | yes	0.006	0.003	0.008	0.2113
COPD	EE + CH | no	0.210	0.220	0.206	
	EE + CH | yes	0.027	0.028	0.026	
	EE + SP | no	0.094	0.057	0.113	
	EE + SP | yes	0.004	0.003	0.005	
	EE only | no	0.502	0.525	0.490	
	EE only | yes	0.025	0.022	0.026	
	FullFam | no	0.120	0.132	0.113	
	FullFam | yes	0.018	0.013	0.021	0.2088
Depression	EE + CH | no	0.218	0.226	0.214	
	EE + CH | yes	0.019	0.022	0.018	
	EE + SP | no	0.093	0.060	0.110	
	EE + SP | yes	0.005	0.000	0.008	
	EE only | no	0.500	0.525	0.487	
	EE only | yes	0.027	0.022	0.029	
	FullFam | no	0.124	0.132	0.120	
	FullFam | yes	0.014	0.013	0.015	0.1908
Diabetes	EE + CH | no	0.230	0.242	0.223	
	EE + CH | yes	0.007	0.006	0.008	
	EE + SP | no	0.088	0.053	0.105	
	EE + SP | yes	0.011	0.006	0.013	
	EE only | no	0.503	0.525	0.492	
	EE only | yes	0.024	0.022	0.024	
	FullFam | no	0.128	0.135	0.125	
	FullFam | yes	0.010	0.009	0.010	
Hyperlipidemia	EE + CH | no	0.214	0.239	0.201	
	EE + CH | yes	0.024	0.009	0.031	
	EE + SP | no	0.065	0.044	0.076	
	EE + SP | yes	0.033	0.016	0.042	
	EE only | no	0.444	0.503	0.414	
	EE only | yes	0.082	0.044	0.102	
	FullFam | no	0.116	0.129	0.110	
	FullFam | yes	0.021	0.016	0.024	0.0004
Hypertension	EE + CH | no	0.202	0.217	0.194	
	EE + CH | yes	0.035	0.031	0.037	
	EE + SP | no	0.062	0.038	0.074	
	EE + SP | yes	0.036	0.022	0.044	
	EE only | no	0.425	0.481	0.396	
	EE only | yes	0.101	0.066	0.120	
	FullFam | no	0.105	0.123	0.095	
	FullFam | yes	0.033	0.022	0.039	0.0041
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.11 Bivariate Distributions, Coverage Tier and Number of Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
	EE + CH | 0	0.139	0.154	0.131	
	EE + CH | 1	0.069	0.066	0.071	
	EE + CH | 2+	0.029	0.028	0.029	
	EE + SP | 0	0.033	0.031	0.034	
	EE + SP | 1	0.027	0.006	0.037	
	EE + SP | 2+	0.038	0.022	0.047	
	EE only | 0	0.300	0.374	0.262	
	EE only | 1	0.151	0.126	0.163	
	EE only | 2+	0.076	0.047	0.091	
	FullFam | 0	0.061	0.082	0.050	
	FullFam | 1	0.048	0.047	0.049	
	FullFam | 2+	0.029	0.016	0.036	0.0003
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.12 Bivariate Distributions, USC and Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
Asthma	no | no	0.161	0.289	0.095	
	no | yes	0.002	0.003	0.002	
	yes | no	0.770	0.657	0.828	
	yes | yes	0.066	0.050	0.074	< 0.0001
COPD	no | no	0.160	0.286	0.095	
	no | yes	0.003	0.006	0.002	
	yes | no	0.766	0.648	0.827	
	yes | yes	0.071	0.060	0.076	< 0.0001
Depression	no | no	0.162	0.292	0.095	
	no | yes	0.001	0.000	0.002	
	yes | no	0.772	0.651	0.835	
	yes | yes	0.064	0.057	0.068	< 0.0001
Diabetes	no | no	0.161	0.286	0.097	
	no | yes	0.002	0.006	0.000	
	yes | no	0.787	0.670	0.848	
	yes | yes	0.049	0.038	0.055	< 0.0001
Hyperlipidemia	no | no	0.159	0.286	0.094	
	no | yes	0.004	0.006	0.003	
	yes | no	0.681	0.629	0.707	
	yes | yes	0.156	0.079	0.196	< 0.0001
Hypertension	no | no	0.156	0.280	0.092	
	no | yes	0.007	0.013	0.005	
	yes | no	0.638	0.579	0.668	
	yes | yes	0.199	0.129	0.235	< 0.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Table 2.13 Bivariate Distributions, USC and Number of Chronic Conditions

		Proportions			
		Total	**DPC**	**Standard**	**p-value**
	no | 0	0.142	0.255	0.084	
	no | 1	0.017	0.035	0.008	
	no | 2+	0.004	0.003	0.005	
	yes | 0	0.391	0.387	0.393	
	yes | 1	0.278	0.211	0.312	
	yes | 2+	0.168	0.110	0.197	<0.0001
Total N (%)		936 (100%)	318 (34%)	618 (66%)	

Final model for logistic regression

The model for the logistic regression included enrollee age, enrollee sex, enrollee race/ethnicity, coverage tier, total number of chronic conditions, and usual source of care. Additionally, the interaction of enrollee age and enrollee sex was included, as patterns of expenditures and health care utilization by age differ by sex (AHRQ 2020), which was likely to affect plan type selected. Results of the initial model are shown in Table 2.14. Variables that were statistically significantly associated with plan choice at the 5% level include age, race/ethnicity, and USC. Families of enrollee 45 years old or older were less likely than families of younger enrollees to select DPC. Families with black enrollees were less likely and families of enrollees of other race/ethnicity were more likely to choose DPC than families of white enrollees. Families with a USC were less likely to select DPC than families without.

Initial results (Table 2.14) indicated that some of the variables were not statistically significant. Reduced models were tested until no additional variables could be removed. The variable for total number of chronic conditions was redefined as a 0/1 variable (where 1 represented 1 or more chronic conditions in the family) since not all values in the original definition were statistically significant in the regression. The final logistic regression model included enrollee age, enrollee race/ethnicity, total number of chronic conditions (0/1) and usual source of care.

To examine the strength of association between the independent variables and DPC plan choice in the regression analysis, marginal effects were examined. Marginal effects express the change in the predicted probability of DPC plan choice associated with a 1-unit change in the independent variable. Each of the independent variables are 0/1 variables, indicating a 1-

unit change is an increase from 0 to 1 (no to yes). The average marginal effect for all families in the dataset was reported, realizing that it was larger for some families and smaller for others as it depended on the values of other variables. Table 2.15 presents the effects of the various enrollee and family characteristics on health plan choice.

Table 2.14 Logistic Regression of Binary Plan Choice - Initial Model

Dependent Variable = Plan			
Variable	**Coefficient**	**SE**	**p-value**
Age 45+ (ref=<45)	-0.411	0.207	0.047
Sex Male (ref=female)	-0.249	0.217	0.251
Age * Sex Interaction	0.483	0.292	0.099
Race/ethnicity (ref=white)			
Black	-0.540	0.195	0.006
Other	0.484	0.211	0.022
Coverage Tier (ref=EE+SP)			
EE+CH	0.207	0.140	0.138
EE only	-0.008	0.122	0.950
Full Fam	0.273	0.165	0.099
Chronic Conditions(s) (ref=two or more)			
None	0.217	0.112	0.052
One	-0.019	0.117	0.871
Usual Source of Care (ref=none)	-1.253	0.203	<.0001

Table 2.15 Logistic Regression of Binary Plan Choice - Final Model

Dependent Variable = Plan			
Variable	**Coefficient**	**SE**	**Marginal Effect**
Age 45+ (ref=<45)	-0.272	0.152	-0.074 *
Race/ethnicity (ref=white)			
Black	-0.514	0.193	-0.140 ***
Other	0.471	0.207	0.128 **
With Chronic Conditions(s) (ref=none)	-0.311	0.158	-0.085 **
Usual Source of Care (ref=none)	-1.181	0.194	-0.322 ***

* indicates significance at the 10% level
** indicates significance at the 5% level
*** indicates significance at the 1% level

Some of the factors which were found to be important in the descriptive analysis by plan choice remain statistically significant in the regression analysis for at least some of the categories. Enrollees 45 or older were 7.4% less likely to choose DPC than enrollees younger than 45. This result is statistically significant at the 10% level. Age was statistically significant (p=0.0002) in the univariate descriptive analysis and age was statistically significant with every other variable in the bivariate descriptive analysis. Sex was not statistically significant in the regression or the univariate descriptive analysis. The interaction of age and sex was not statistically significant at the 0.05 level in the regression. Race/ethnicity was statistically significant in the regression. Black enrollees were 14.0% less likely to choose DPC than white enrollees and enrollees in the other race/ethnicity category (not black or white) were 12.8% more likely to choose DPC than white enrollees. Race/ethnicity was statistically significant in the univariate descriptive analysis (p=0.0258).

Presence of chronic conditions was statistically significant at the 5% level in the regression analysis. Enrollees with chronic condition(s) in the family were 8.5% less likely to

choose DPC than enrollees with no chronic conditions in the family. Number of chronic conditions was statistically significant ($p<0.0001$) in the univariate descriptive analysis.

Enrollees with a usual source of care in the family (USC) were 32.2% less likely to choose DPC than enrollees with no usual source of care in the family. USC was statistically significant ($p<0.0001$) in the univariate descriptive analysis.

Coverage tier was not statistically significant in the regression analysis and was statistically significant in the univariate descriptive analysis ($p=0.0443$).

2.4 Discussion

In an employee plan choice situation in which the two plan options differed only in elements related to primary care, a family's presence of a usual source of care was both most statistically significant (as the only factor that was statistically significant at the 1% level) and had the largest marginal effect. Families with a usual source of care were 32.2% less likely to choose DPC than families without. Having a usual source of care in this study was defined as any family member having seen the same primary care provider more than once in the pre-period.

There could be different situations that result in not having a usual source of care: family members may use other providers such as emergency rooms, urgent care centers or specialists as their USC; family members may be switching primary care providers because of dissatisfaction with care so they've not seen the same primary care provider more than once; or family members may not utilize much care at all and so none of them happened to use the same primary care provider more than once in the pre-period, among other possible reasons. Whatever the reason for not having a USC, this factor being the most powerful predictor of DPC

choice suggests that having a USC may cause a family to be less open to switching to a new primary care provider. All families who selected the DPC plan were required to switch primary care providers to those available in the near-site DPC clinic. USC is not a pure measure of health status or overall health care utilization, rather, it is a combination of how much care the family utilizes, how they utilize care (i.e., how much they tend to utilize primary care vs other care) and whether they value seeing the same provider repeatedly.

The long-term viability of a new model of primary care delivery like DPC will depend on the willingness of patients to switch primary care providers. This research shows that patients with a usual source of care are less likely to switch to DPC at the first opportunity (when it is initially offered as a choice). Future research examining the willingness of employees with a USC to switch to DPC upon the second or later opportunity may shed light on the long-term viability of DPC as part of a dual choice employer-sponsored medical benefit offering. Perhaps employees with a USC will be more willing to switch to DPC after some time has passed if they hear of positive experiences of DPC from coworkers.

The importance of a usual source of care in the plan choice decision in this study supports the notion that the primary care doctor-patient relationship is vitally important to patients and families. As shown, the presence of a usual source of care is not taken lightly; employees with a USC in the family were 32.2% less likely to choose DPC, which necessitated switching to a new primary care physician. This confirms the result of other studies; having a usual source of care or attachment to the physician had the strongest influence on whether people stayed or switched (Grazier, Richardson et al. 1986, Hellinger 1987), when switching to a new plan required switching to a new PCP. Additionally, the importance of a USC in this study is

consistent with the view that primary care is critical to the health of patients and the performance of the health care system (Starfield 1994, Macinko, Starfield et al. 2003, Starfield, Shi et al. 2005).

For this employee choice situation, families with no chronic conditions were 8.5% more likely to choose DPC than families with any chronic condition(s). Similar to other studies, counts of conditions perform almost as well as more complex measures (Huntley, Johnson et al. 2012) and counts of chronic conditions are commonly used when the purpose of the health status variable is for selection (Grazier, Richardson et al. 1986, Naessens, Khan et al. 2008), as in the current research. This study confirms the result of other studies that healthier patients were more likely (vs less healthy patients) to choose a plan with restricted physician choice or that required switching to a new PCP (Scanlon, Chernew et al. 1997, Fowles, Kind et al. 2004, Parente, Feldman et al. 2004).

Studies of plan selection between HMO and PPO options in an employee choice situation found age and sex to be statistically significant (Grazier, Richardson et al. 1986, Fowles, Kind et al. 2004, Shin and Moon 2007, Naessens, Khan et al. 2008). This study differs from the HMO/PPO studies in that there was essentially no financial impact of plan choice for enrollees; enrollees choosing between HMO and PPO options in published studies faced impacts both financially and in terms of provider choice / requirement to switch to a new PCP. Our study adds to the literature in that financial considerations were not relevant to plan choice.

Results showed plan choice relationships with race and that black enrollees were 12.9% less likely than whites to choose DPC. The bivariate analysis showed black race/ethnicity

appeared more influential on plan choice than age or the presence of chronic conditions; in contrast, race/ethnicity was less influential than age or CCs for white and other race/ethnicity enrollees. Black enrollees were much more likely to be female and to choose EE only coverage tier than whites (79.2% vs 49.2% and 67.3% vs50.8%, respectively). Further research from a larger population from various geographic areas and with socioeconomic variables would be needed to understand how race/ethnicity might be associated with DPC plan choice.

This study did not find that coverage tier was associated with DPC plan choice. This is in contrast to published studies in which employees chose between HMO and PPO options, which differ in both financial impact and provider choice/requirement to switch PCPs (Juba, Lave et al. 1980, Scanlon, Chernew et al. 1997). Savings when choosing the HMO will be higher for rate tiers that include more people; perhaps the higher financial impact influences larger families to select the HMO. In this study, plan choice does not involve a higher financial impact for larger families.

Limitations of this data include lack of age, sex and race/ethnicity for dependents and enrollee demographic variables not necessarily being representative of the family as a whole. Variables representing income/poverty level or other socioeconomic status (SES) variables were not available for inclusion in the regression analysis. It is possible that race/ethnicity functioned as a proxy for SES in this study. Race/ethnicity is often used as a proxy for socioeconomic status and the two constructs are strongly associated (Schulman, Rubenstein et al. 1995, Nuru-Jeter, Sarsour et al. 2010, Williams, Priest et al. 2016). Given that the other race/ethnicity category was small (55 enrollees) and that it was less heterogeneous than white or black categories, being comprised of Hispanic as well as other enrollees, caution about generalizing from the

results for other race/ethnicity is warranted. In small categories, a change in the choice of a few enrollees could change the direction and magnitude of an effect considerably. Caution should be exercised when comparing these results to other studies for usual source of care as the variable used here was based on claims data and other studies often use survey data.

As this data is from a single employer group, care should be used when applying these findings to employer groups of different size, geographic region or industry. The findings should not be used to draw conclusions about selection of DPC where the patient is paying directly for care, as financial considerations are likely to be the most salient factors considered by many patients when an employer is not paying for DPC and medical insurance.

2.5 Conclusions

In this first study of selection of a DPC option in an employee choice situation, results for some variables were similar to selection results when employees chose between HMO and PPO options. Enrollees with a USC in the family, enrollees with any chronic conditions in the family, older enrollees, and black enrollees were less likely to choose DPC. In this study, enrollees chose only based on factors related to primary care delivery, including whether switching to a new PCP was required.

While caution is always warranted when generalizing results from one group of participants to a different population, particularly when some categories are small (as with race/ethnicity in this study), advantages of this data strengthen the generalizability of the findings. As a natural experiment, this data represents plan choice in the real world. As it uses a relatively large dataset of nearly 2,000 members and 1,000 families, findings are more valid and reliable than studies of smaller datasets. As the DPC option and the Standard option were the

same for premiums and non-primary care benefits, plan selection was based only on factors related to primary care delivery. As such, findings were not conflated by considerations outside of primary care delivery. In addition, with one exception variables were included for patient characteristics that have been shown to vary with plan choice and that are relevant for this data (in which selection was based only on factors related to primary care). Age, sex, family size (as represented by coverage tier), health status (as represented by chronic conditions) and usual source of care were examined.

There is always concern that younger and healthier people will select the lower cost plan when they have options. If not properly accounted for, this positive selection can make the experience of the lower cost plan appear more favorable than it is. While healthier people were somewhat more likely to select DPC, the most impactful factor was related to the necessity of switching to a new PCP if the DPC plan was selected; families with a USC were less likely to select DPC than families without.

As health care spending consumes a large and increasing share of the economy, whether an initiative or alternative payment model can reduce spending is perhaps the most important question to examine. This selection study is an important input into future studies of the ability of DPC to reduce utilization and expenditures when offered as one option in an employee medical benefit offering. The next study examined specialist visits by plan.

2.6 Works Cited

Abramson, C., T. Buchmueller and I. Currim (1998). "Models of health plan choice." European Journal of Operational Research **111**(2): 228-247.

Alexander, G. C., J. Kurlander and M. K. Wynia (2005). "Physicians in retainer ("concierge") practice. A national survey of physician, patient, and practice characteristics." J Gen Intern Med **20**(12): 1079-1083.

Altman, D., D. M. Cutler and R. J. Zeckhauser (1998). "Adverse selection and adverse retention." American Economic Review **88**(2): 122-126.

Anderson, G. (2010). Chronic Care: Making the Case for Ongoing Care, Agency for Healthcare Research and Quality.

Barker, I., A. Steventon and S. R. Deeny (2017). "Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data." BMJ **356**: j84.

Barnes, A. J., M. Karpman, S. K. Long, Y. Hanoch and T. Rice (2021). "More intelligent designs: Comparing the effectiveness of choice architectures in US health insurance marketplaces." Organizational Behavior and Human Decision Processes **163**: 142-164.

Berchick E.R., B. J. C., Upton R.D. (2018). Health Insurance Coverage in the United States: 2018, U.S. Census Bureau.

Berki, S. E. and M. L. F. Ashcraft (1980). "Hmo Enrollment - Who Joins What and Why - a Review of the Literature." Milbank Memorial Fund Quarterly-Health and Society **58**(4): 588-632.

Buchmueller, T. C. (2009). "Consumer-oriented health care reform strategies: a review of the evidence on managed competition and consumer-directed health insurance." Milbank Q **87**(4): 820-841.

Bundorf, K. (2003). The Effects of Offering Health Plan Choice Within Employment-Based Purchasing Groups. N. B. o. E. Research.

Claxton, G., M. Rae, M. Long, A. Damico and H. Whitmore (2018). "Health Benefits In 2018: Modest Growth In Premiums, Higher Worker Contributions At Firms With More Low-Wage Workers." Health Aff (Millwood) **37**(11): 1892-1900.

Claxton, G., Rae, M. Damico, A., Young, G., McDermott, D. (2019). Employer Health Benefits: 2019 Annual Survey, Henry J Kaiser Family Foundation.

Cunningham, P. J. and L. Kohn (2000). "Health plan switching: choice or circumstance?" Health Aff (Millwood) **19**(3): 158-164.

Cutler, D., B. Lincoln and R. Zeckhauser (2010). "Selection stories: understanding movement across health plans." J Health Econ **29**(6): 821-838.

Cutler, D., Zeckhauser, R. (1999). "The Anatomy of Health Insurance." National Bureau of Economic Research.

Deb, P., V. Wilcox-Gok, A. Holmes and J. Rubin (1996). "Choice of health insurance by families of the mentally ill." Health Econ **5**(1): 61-76.

Draper, D. A., R. E. Hurley, C. S. Lesser and B. C. Strunk (2002). "The changing face of managed care." Health Aff (Millwood) **21**(1): 11-23.

Ellis, R. P. (1989). "Employee Choice of Health-Insurance." Review of Economics and Statistics **71**(2): 215-223.

Feldman, R., M. Finch, B. Dowd and S. Cassou (1989). "The Demand for Employment-Based Health-Insurance Plans." Journal of Human Resources **24**(1): 115-142.

Fowles, J. B., E. A. Kind, B. L. Braun and J. Bertko (2004). "Early experience with employee choice of consumer-directed health plans and satisfaction with enrollment." Health Serv Res **39**(4 Pt 2): 1141-1158.

Frech, H. E. and M. P. Smith (2015). "Anatomy of a Slow-Motion Health Insurance Death Spiral." North American Actuarial Journal **19**(1): 60-72.

Gabel, J. R. (1999). "Job-based health insurance, 1977-1998: the accidental system under scrutiny." Health Aff (Millwood) **18**(6): 62-74.

Gabel, J. R., P. B. Ginsburg, H. H. Whitmore and J. D. Pickreign (2000). "Withering on the vine: the decline of indemnity health insurance." Health Aff (Millwood) **19**(5): 152-157.

Goodman, R. A., S. F. Posner, E. S. Huang, A. K. Parekh and H. K. Koh (2013). "Defining and measuring chronic conditions: imperatives for research, policy, program, and practice." Prev Chronic Dis **10**: E66.

Gornick, M. E. (2002). Measuring the Effects of Socioeconomic Status on Health Care. Guidance for the National Healthcare Disparities Report. Washington, D.C., Institute of Medicine of the National Academies.

Grazier, K. L., W. C. Richardson, D. P. Martin and P. Diehr (1986). "Factors affecting choice of health care plans." Health Serv Res **20**(6 Pt 1): 659-682.

Hall, A. G., C. H. Lemak, H. Steingraber and S. Schaffer (2008). "Expanding the definition of access: it isn't just about health insurance." J Health Care Poor Underserved **19**(2): 625-638.

Heckman, J. J. (1979). "Sample Selection Bias as a Specification Error." Econometrica **47**(1): 153-161.

Hellinger, F. J. (1987). "Selection bias in health maintenance organizations: analysis of recent evidence." Health Care Financ Rev **9**(2): 55-63.

Hellinger, F. J. (1995). "Selection bias in HMOs and PPOs: a review of the evidence." Inquiry **32**(2): 135-142.

Hellinger, F. J. and H. S. Wong (2000). "Selection bias in HMOs: a review of the evidence." Med Care Res Rev **57**(4): 405-439.

HintHealth (2023). "Trends in Direct Primary Care 2022."

Huntley, A. L., R. Johnson, S. Purdy, J. M. Valderas and C. Salisbury (2012). "Measures of multimorbidity and morbidity burden for use in primary care and community settings: a systematic review and guide." Ann Fam Med **10**(2): 134-141.

Juba, D. A., J. R. Lave and J. Shaddy (1980). "An analysis of the choice of health benefits plans." Inquiry **17**(1): 62-71.

Kirby, J. B. and K. R. Yabroff (2020). "Rural-Urban Differences in Access to Primary Care: Beyond the Usual Source of Care Provider." Am J Prev Med **58**(1): 89-96.

Klinkman, M. S. (1991). "The process of choice of health care plan and provider: development of an integrated analytic framework." Med Care Rev **48**(3): 295-330.

Lako, C. J., P. Rosenau and C. Daw (2011). "Switching health insurance plans: results from a health survey." Health Care Anal **19**(4): 312-328.

Langwell, K. M. (1990). "Structure and performance of health maintenance organizations: a review." Health Care Financ Rev **12**(1): 71-79.

Macinko, J., B. Starfield and L. Shi (2003). "The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998." Health Serv Res **38**(3): 831-865.

Marquis, M. S. (1992). "Adverse Selection with a Multiple-Choice among Health-Insurance Plans - a Simulation Analysis." Journal of Health Economics **11**(2): 129-151.

McDevitt, R. D., A. M. Haviland, R. Lore, L. Laudenberger, M. Eisenberg and N. Sood (2014). "Risk selection into consumer-directed health plans: an analysis of family choices within large employers." Health Serv Res **49**(2): 609-627.

Merrill, J., C. Jackson and J. Reuter (1985). "Factors That Affect the Hmo Enrollment Decision - a Tale of 2 Cities." Inquiry-the Journal of Health Care Organization Provision and Financing **22**(4): 388-395.

Naessens, J. M., M. Khan, N. D. Shah, A. Wagie, R. A. Pautz and C. R. Campbell (2008). "Effect of premium, copayments, and health status on the choice of health plans." Med Care **46**(10): 1033-1040.

Nicholson, S., K. Bundorf, R. M. Stein and D. Polsky (2004). "The magnitude and nature of risk selection in employer-sponsored health plans." Health Serv Res **39**(6 Pt 1): 1817-1838.

Nuru-Jeter, A. M., K. Sarsour, D. P. Jutte and W. T. Boyce (2010). "Socioeconomic predictors of health and development in middle childhood: variations by socioeconomic status measure and race." Issues Compr Pediatr Nurs **33**(2): 59-81.

Parente, S. T., R. Feldman and J. B. Christianson (2004). "Employee choice of consumer-driven health insurance in a multiplan, multiproduct setting." Health Serv Res **39**(4 Pt 2): 1091-1112.

Robinson, J. C., L. B. Gardner and H. S. Luft (1993). "Health plan switching in anticipation of increased medical care utilization." Med Care **31**(1): 43-51.

Rowe, K., W. Rowe, J. Umbehr, F. Dong and E. Ablah (2017). "Direct Primary Care in 2015: A Survey with Selected Comparisons to 2005 Survey Data." Kans J Med **10**(1): 3-6.

Samuelson, W., Zeckhauser, R. (1988). "Status quo bias in decision making." Journal of Risk and Uncertainty.

Scanlon, D. P., M. Chernew and J. R. Lave (1997). "Consumer health plan choice: current knowledge and future directions." Annu Rev Public Health **18**: 507-528.

Schlesinger, M., B. Druss and T. Thomas (1999). "No exit? The effect of health status on dissatisfaction and disenrollment from health plans." Health Serv Res **34**(2): 547-576.

Schram, A. and J. Sonnemans (2011). "How individuals choose health insurance: An experimental analysis." European Economic Review **55**(6): 799-819.

Schulman, K. A., L. E. Rubenstein, F. D. Chesley and J. M. Eisenberg (1995). "The roles of race and socioeconomic factors in health services research." Health Serv Res **30**(1 Pt 2): 179-195.

Schwartz, J., N. M. Hadler, D. Ariely, J. C. Huber and T. Emerick (2013). "Choosing among employer-sponsored health plans: what drives employee choices?" J Occup Environ Med **55**(3): 305-309.

Shin, J. and S. Moon (2007). "HMO plans, self-selection and utilization of health care services." Applied Economics **39**(21): 2769-2784.

Starfield, B. (1994). "Is primary care essential?" Lancet **344**(8930): 1129-1133.

Starfield, B., L. Shi and J. Macinko (2005). "Contribution of primary care to health systems and health." Milbank Q **83**(3): 457-502.

Tu, H. and P. Cunningham (1997). "Strong opinions held about the tradeoff between choice of providers and cost of care." Data Bull (Cent Stud Health Syst Change)(4): 1-2.

Vella, F. (1993). "A Simple Estimator for Simultaneous Models with Censored Endogenous Regressors." International Economic Review **34**(2): 441-457.

Williams, D. R., N. Priest and N. B. Anderson (2016). "Understanding associations among race, socioeconomic status, and health: Patterns and prospects." Health Psychol **35**(4): 407-411.

Wouters, A. V. and J. Hester (1988). "Patient Choice of Providers in a Preferred Provider Organization." Medical Care **26**(3): 240-255.

Chapter 3: Specialist Visits

Reductions in the number of specialist visits is an ongoing form of health care cost reform. High specialist visits can indicate complex and expensive treatment due to multiple conditions (Pham, Schrag et al. 2007), and can bring challenge to health systems through care coordination (Starfield, Shi et al. 2005) and inefficient referral processes (Mehrotra, Forrest et al. 2011). Reductions in specialist visits may also decrease duplication and avoid conflicting messages to patients (Colwill, Frey et al. 2016). Patients whose personal physician is a primary care physician rather than a specialist have been shown to have lower overall health care expenditures (Franks and Fiscella 1998). Direct Primary Care (DPC) has the potential to lower health care costs by reducing unnecessary care through specialist visits and other care.

DPC is a financing and delivery model in which patients (or employers) pay directly for care via a membership model. The median self-pay adult DPC fee was $75 per month in 2020 and the median monthly DPC fee paid by an employer for a family of four in 2021 was $158 (HintHealth 2023). DPC physicians provide unlimited access to a defined set of primary care services, including coordination and navigation services. DPC models have the potential to reduce health care spending for a number of reasons. They do not accept payment from insurance companies or other third-party payers, which frees up their time for patient care and prompts them to more fully embrace an agency/fiduciary role with their customer patients. With a full panel of roughly 25% of the patients of a traditional insurance-based primary care physician (PCP), DPC physicians may have more availability than their traditional counterparts. Early results reported by DPC practices seem to indicate the model may hold promise for improving patient outcomes and lowering overall health care expenditures. Yet, most of the information on DPC benefits is anecdotal and superficial. Currently, there are no peer-reviewed

studies comparing patient outcomes in DPC and traditional primary care delivery that have been published. This research aims to determine whether DPC reduces specialist visits in a dual choice employer benefit plan.

3.1 Literature Review

Specialty visits, expenditures and referral rates have increased significantly in recent years. From 2012 to 2016, PCP office visits and expenditures declined 18% and 6%, respectively, while specialist office visits (not including preventive visits) and expenditures increased 15% and 30%, respectively (HCCI 2018). Between 1999 and 2009, the probability that a visit to an ambulatory physician would result in a referral to another physician increased from 4.8% to 9.3% (Barnett, Song et al. 2012). Rates of specialty referral from primary care physicians increase as demands on their time increase (Forrest, Nutting et al. 2006, Colwill, Frey et al. 2016); yet many specialist visits could be handled in a primary care setting (Starfield, Shi et al. 2005, Valderas, Starfield et al. 2009).

Compared to primary care physicians, specialists tend to use more intense health care services, prescribe more medications and more diagnostic tests (Franks, Clancy et al. 1992), and expenditures are higher when more care is provided by specialists (Donaldson 1996). A systematic review (Harrold, Field et al. 1999) and a comprehensive study published by the Institute of Medicine (Donaldson 1996) find that quality is no better with specialty care than with primary care, and spending is higher, although findings vary by type of specialist and disease or condition being treated. In an effort to lower health care expenditures, there is a focus on reducing unnecessary specialist visits (Peikes, Taylor et al. 2020) and unnecessary specialty services and procedures (Cassel and Guest 2012). This research will determine

whether Direct Primary Care reduced specialist visits in a dual choice employer benefit situation.

Comprehensiveness and scope of practice

Scope of practice and comprehensiveness are closely related concepts that have been a focus of health care reform due to the implications for health care expenditures. Formally, the scope of practice refers to the services and processes that a clinician is allowed to perform according to their training and professional license. Additionally, physicians use the term to indicate those services that they routinely provide in the process of taking care of their patients; that is, the common usage is more restrictive than the formal usage in that physicians may be trained and licensed to perform services that they do not routinely offer in practice. Primary care is comprehensive "to the extent to which primary care practitioners provide a broader range of services rather than making referrals to specialists for those services" (Starfield, Shi et al. 2005, p. 467). Comprehensiveness may also be characterized as "the provision of care across a broad spectrum of health problems, age ranges, and treatment modalities" (Bazemore, Petterson et al. 2015, p. 206).

Evidence suggests that PCP comprehensiveness is narrowing (Phillips and Haynes 2001, Bazemore, Petterson et al. 2011, Okie 2012). In a traditional insurance-based setting, the payment method provides an incentive for the PCP to reduce comprehensiveness. Fee-for-service (FFS) remains the dominant payment model. Ninety-five percent of physician office visits are paid on a FFS basis; even when a health plan is paid on a capitated basis, physicians are usually paid on a FFS basis (Zuvekas and Cohen 2016). FFS payment incentivizes volume and with declining reimbursements, PCPs optimize their financial situation by referring rather than

spending more time per visit trying to solve problems themselves, as this would not yield any additional compensation (Dugdale, Epstein et al. 1999, Mechanic, McAlpine et al. 2001, ACP 2006). Comprehensiveness declines as a result.

In contrast to the traditional FFS structure, physicians practicing in a DPC model are not paid based on volume of services. They have incentive to provide a broad scope of practice to maximize the value of a DPC membership and to minimize the inconvenience and extra costs of unnecessary specialty care (Schimpff 2014, Palumbo 2017).

Specialty referral rates

Increases in referral rates have been linked to many physician-related factors such as visit length, perceived lack of time to see patients, and PCP scope of practice, as well as the increasing level of stress and burnout that PCPs experience. As PCP scope of practice shrinks and perceived time pressure increases, the specialty referral rate increases (Forrest, Nutting et al. 2006, Colwill, Frey et al. 2016) and many visits that could be handled just as well in primary care are being referred to specialists (Starfield, Shi et al. 2005, Valderas, Starfield et al. 2009).

While PCP visit length has not decreased, physicians report increasing time pressures due in part to additional tasks they are expected to perform during visits. A nationally representative study of adult visits to PCPs from 2007 through 2016 found that average visit duration increased by 2.4 minutes per visit as PCPs addressed 0.30 more diagnoses and 0.82 more medications, and provided 0.24 more preventive services Third party payers have increased requirements related to electronic health records (EHRs), quality metrics and pre-authorization tasks (Sommers, Hacker et al. 2001, Erickson, Rockwern et al. 2017). When more time is needed to complete required administrative tasks, less time is available for patient care.

Additionally, physicians often express concern that they cannot spend enough time with patients (Morrison and Smith 2000, Grumbach and Bodenheimer 2002, Bodenheimer and Pham 2010). Surveys reveal that the portion of PCPs reporting that they have sufficient time with patients has declined (Burdi and Baker 1999, Levine 2004) and that they only spend about 25% of their time in face-to-face interactions with patients in the examination room (Sinsky, Colligan et al. 2016); time pressure, whether real or perceived, leads to a reduction in the PCP scope of practice (Okie 2012, Phillips, Pugno et al. 2014, Bazemore, Petterson et al. 2015).

PCP burnout is another factor associated with increased specialist referrals. Higher burnout rates and higher rates of objective workload are associated with higher specialty referral rates (Kushnir, Kushnir et al. 2011, Kushnir, Greenberg et al. 2014). Declining reimbursements and increasing administrative tasks (such as pre-approvals, quality metrics, and EHR requirements) mandated by third party payers add to the time pressures felt by PCPs and contribute to burnout, stress, and a desire to leave practice (Gray, Stockley et al. 2012, Bodenheimer and Sinsky 2014, Green and Puffer 2016, Arndt, Beasley et al. 2017).

Primary care and specialty practice

The differences in training and practice between primary and specialty care are important for patient outcomes. Primary care is first-contact, comprehensive, continuous, and coordinated care provided to populations regardless of organ system or disease (Starfield 1994). As specialty care is focused on certain diseases and/or organ systems, it is not usually where patients first contact the health care system with a new concern, and it is less comprehensive, continuous, and coordinated than primary care. As generalists, primary care physicians have broader training and focus than specialists. Unlike specialty care, primary care

tends to be more whole person rather than disease or body system focused; challenges of primary care include dealing with vague symptoms and difficult to resolve problems (Starfield 1994, Starfield 1997).

Specialty care tends to focus more on procedures than primary care, which may lead to higher intensity of services and more diagnostic tests than with PCPs. Specialists tend to use more resources (medications, procedures, ancillary services and longer hospital stays); as a result, patients who receive more of their care from specialists tend to have higher expenditures, all else equal (Donaldson 1996).

Studies comparing patient outcomes in primary and specialty care

In a 1996 report, *Primary Care: America's Health in a New Era* (Donaldson 1996, p. 62) the Institutes of Medicine introduced a review of the literature comparing resource utilization, quality and access to care among specialists and generalists by stating, "Empirical research, though sometimes indirect, indicates that primary care reduces costs, increases access to appropriate medical services for the population being served, and does not reduce the quality of care, thereby advancing the broader social interests." Activities to promote and improve primary care and family medicine have not waned since the 1996 report. A new initiative, Family Medicine for America's Health, was launched in 2013 by eight family medicine organizations to revisit the role of family medicine "and to position family medicine with new strategic and communication plans to create better health, better health care, and lower cost for patients and communities (the Triple Aim)" (Phillips, Pugno et al. 2014).

Many studies comparing outcomes in specialty care and primary care focus on specific diseases (Strauss, Conrad et al. 1986, Jollis, DeLong et al. 1996, Mitchell, Ballard et al. 1996). In addition, ecological studies have compared the outcomes of patients according to how much primary care is available in their area.

Systemic reviews and comprehensive studies by the Institutes of Medicine have compared care provided by generalists (i.e., family medicine and general internal medicine physicians) to that provided by various types of specialists, for numerous different ailments or conditions; most studies showed no significant difference in quality or patient outcomes (mortality in most studies) and either no significant difference in cost or significantly lower cost with primary care (Donaldson 1996, Harrold, Field et al. 1999).

A broader study (not focused on specific diseases) found that patients whose usual physician is a generalist had significantly lower health care expenditures and better mortality compared to those whose usual physician is a specialist, after adjusting for relevant covariates (Franks and Fiscella 1998). Another more recent study of Medicare beneficiaries found no statistically significant differences between mortality and hospitalization outcomes for ambulatory care sensitive conditions when most care was provided by a primary care physician or a specialist; although spending was 9% lower when most care was provided by primary care physicians (Starfield 2008).

Ecological studies that examine the availability and use of primary care in the community suggest that patients who live in areas with more primary care have better outcomes (Macinko, Starfield et al. 2003, Starfield, Shi et al. 2005, Smetana, Landon et al. 2007).

Incentives created by how primary care practices are paid

Third party payment schemes may erode the tenets of primary care (delivering comprehensive, whole-person, longitudinal care consistently and with high quality). FFS payment provides an incentive for the PCP to reduce comprehensiveness; ninety-five percent of physician office visits are paid on a FFS basis, even when the health plan is paid on a capitation basis (Zuvekas and Cohen 2016). FFS payment incentivizes volume and with declining reimbursements, PCPs optimize their financial situation by referring rather than spending more time per visit trying to solve problems themselves, as this would not yield any additional compensation (Dugdale, Epstein et al. 1999, Mechanic, McAlpine et al. 2001, ACP 2006). Evidence suggests that PCP comprehensiveness is narrowing (Phillips and Haynes 2001, Okie 2012).

Conflicts of interest are inherent with capitation since the physician's interests are potentially at odds with the patient's interests. The physician remunerated via capitation in an HMO contract is subject to rules and restrictions as well as a payment method that may pit the medical interests of the patient against the financial interests of the physician (Ellis and McGuire 1986). The more care a plan provides under prospective payment, the lower its net revenue. Physicians express concern about the lack of alignment between their best clinical judgement about what is best for a patient, and how they are paid under prospective payment methods (Rosenthal and Frank 2006, Friedberg, Chen et al. 2015).

In a direct relationship, the physician does not experience the potential conflict of interest of being expected to serve the interests of both the patient and the insurance company, health plan, or government program, and the financial pressures of managed care

that contribute to short visits, lack of flexibility to spend more time with complex patients, and smaller scope of practice are absent (Shortell, Waters et al. 1998, Thom, Hall et al. 2004). When patients receive more care and less costly care through the DPC practice, they have the potential to receive more value for DPC membership fees.

DPC physicians are motivated to view patients as customers; they want patients to be satisfied with the care they receive so they continue to be a member and so they tell others of their good experiences at the DPC practice, thereby helping the practice to grow. DPC physicians are likely not unique in valuing patient satisfaction, however, financial incentives of the physician and the patient are better aligned in a DPC model than in a traditional insurance-based model of primary care delivery. DPC physicians can provide value in numerous ways, including broad scope of practice, fewer specialist referrals, use of electronic consult services rather than referrals for some specialist visits, dispensing prescription medications at wholesale, deep discounts for labs and imaging for cash-paying patients, and navigation of downstream care when it is needed.

From the standpoint of physician incentives, DPC practice is similar for both self-pay and employer-paid plans. In both cases, a membership or subscription model is used, and unlimited access to a defined set of primary care services is provided in exchange for a fixed monthly membership fee. The DPC practice has an incentive to take the best possible care of the patient so that the patient and employer are satisfied with the care and the value received and will be motivated to keep the DPC plan in place and tell coworkers and friends about their experience, thereby potentially increasing the patient panel and employer customer base in the future.

While the DPC practice is incentivized to provide as much overall value as possible, there may be differences in how this is put into practice in the direct-to-patient case vs the case in which an employer is paying the DPC fees. When a DPC practice's panel is comprised primarily of individuals rather than employees and dependents of an employer customer, their patients will have various financial and coverage situations. To the extent that patients are uninsured or have financial protection that requires them to pay a large sum out of pocket before coverage begins (for example, with a high deductible plan or a health share with a high unshared amount), the patient will be sensitive to all costs in addition to the DPC membership fee. For such patients, the value of their DPC membership is maximized when costs and utilization of downstream care are minimized and the DPC practice is incentivized to minimize specialty referrals and all other downstream costs.

In contrast, when the DPC practice primarily serves employees and dependents of employers whose benefit plan covers downstream care comprehensively with little cost to the employee, the DPC practice may focus less on preventing unnecessary specialty referrals and other low or moderately priced downstream services and may focus more on minimizing unnecessary use of the most expensive parts of health care, such as emergency rooms and other hospital care.

Another difference between DPC practice incentives when their panel is dominated by individual patients and when it is dominated by employer groups, is that individual patients may decide to leave the practice at any point while employer contracts with the DPC practice generally run for a year or perhaps multiple years. Employers review their benefit offering annually, examining costs, overall utilization patterns, and reports of customer service

experience (problems or satisfaction) that the human resources department has gathered since the previous review. The differences in the customer situations, perspectives and time frames of individual and employer customers cause the DPC practice to view customer value and satisfaction at a different level and time frame. The individual customer is sensitive to individual transactions from both a customer service and a financial standpoint. The employer customer is much less sensitive to individual transactions and instead, is looking at the aggregate results annually.

In summary, the specialty care literature indicates that availability and comprehensiveness of primary care may reduce specialty referrals, which should reduce specialist visits and expenditures. This research will evaluate whether specialist visits are lower in DPC compared to traditional primary care delivery, in an employer-paid dual choice situation.

3.2 Data and Methodology

Data for this study came from a large employer group, a county in North Carolina, that started offering a Direct Primary Care health benefit option for the plan year that began on July 1, 2015. Nine hundred thirty-six employees made a health benefit election for the 2015 plan year. Before the DPC option was added to the group's benefit offering, one plan was offered and that plan (which was referred to as the Standard plan) has continued to be offered unchanged. Both the DPC and the Standard options had the same benefits for non-primary care services and the employee portion of premium did not vary by plan. The DPC option and the Standard option were the same for elements related to non-primary care services and for financial elements such as premiums and out of pocket costs. DPC was provided at a site near

the county's office by a DPC company that specialized in dedicated near-site and on-site clinics for large employers.

Data included enrollment and claims data from January 2014 through December 2018. DPC was first offered for the plan year that began July 1, 2015. The pre-period was January 2014 through June 2015 and the post-period was July 2015 through September 2018. Data were reported and analyzed through 2018 Q3 to allow three additional months for claims to be processed and reported.

The measure of interest in this paper was number of specialist visits per unit of exposure (1,000 member months). Studies of health care utilization commonly define exposures as 1,000 member months (Tollen, Ross et al. 2004, Wright, Anderson et al. 2021).

Analytic method

Analyses were done at the individual person level. The main analyses used a multiple linear regression difference-in-differences approach to determine the impact of having DPC on specialist visits, adjusting for control variables. One advantage of a difference in differences approach is that unobservable differences between people who choose DPC and people who do not are essentially canceled out in the process of differencing post- and pre-periods.

Descriptive tables showed members enrolled in medical benefits at any time on or after July 1, 2015. Members who were covered in the medical benefit plan prior to July 2015 and who did not continue coverage into the plan year beginning July 1, 2015 were not included in the descriptive tables or any of the analysis in this paper. In the pre-period, members were categorized according to the plan they selected for the plan year beginning July 1, 2015. Descriptive tables showed enrollments and visits by quarter. Summary statistics shown include

portion of members with any specialist visit and number of specialist visits per unit of exposure (1,000 member months). Two-tailed t-tests were done to determine whether summary statistics for DPC and Standard plan members were statistically significantly different in the pre- and post-periods. Statistical comparison between pre- and post-period was not appropriate as they were comprised of different lengths of time (18 and 39 months, respectively).

As employees and covered dependents of large employers are constantly changing as people change jobs or family situations, the census of members enrolled in benefits changes monthly, with the largest change coinciding with annual benefit enrollment. A stable cohort of members was needed for the difference-in-difference analysis so that results were not skewed by members moving into and out of the group. Members covered for a year before DPC was first offered and continuing their coverage for at least a year afterwards would comprise a stable cohort for analysis purposes; this cohort is referred to as the full analysis cohort. In order to take full advantage of the available claims experience, full analysis cohort members were followed past June 2016, until they left the group, switched plans, or the study period ended Sept 30, 2018. The experience of full analysis cohort members after they switched plans in the post-period was excluded because it would be inconsistent with the strength of the difference-in-differences method regarding unobservable factors.

Figure 6.1 in the Appendix shows the flow of members through exclusion criteria. Files provided by the group for members enrolled between January 2014 and December 2018 contained data for 3,511 members. Exclusion of members who first enrolled during the three months of claim runout and exclusion of members who lapsed coverage before DPC was offered resulted in 3,088 members included in Tables labeled All Members throughout the

remainder of this dissertation. Exclusion of members not continuously enrolled for one year before and one year after DPC was first offered resulted in the Full Analysis Cohort of 1,491 members. One additional exclusion criteria was applied in Chapter 5. Members in the top 1% of spenders were excluded as a sensitivity check, which excluded 15 members.

The use of the full analysis cohort, a stable cohort of members who were enrolled in the medical benefit from July 2014 through June 2016, removed the problems of group instability that could have troubled the interpretation of a difference in difference analysis of all members. Interpretation of analysis conducted on all members could be problematic; the impacts of members moving into and out of coverage over the study period could obscure the effects of plan choice on specialist visits. In particular, upon choosing the DPC option, the member is a new patient at the DPC practice; new patient visits look different than existing patient visits and specialist visits may be more frequent as a new patient is established than is usual for a similar existing patient (Schaum 2013). Additionally, the choice process of a new employee is between two new options, whereas the choice process of an existing employee is between the status quo (current) option and a different option (Samuelson 1988). Descriptive and summary tables were done for all members and separately for the full analysis cohort.

Difference-in-differences analysis was conducted on members of the full analysis cohort. In the pre-period, members were categorized according to the plan they selected for the plan year beginning July 1, 2015. This allowed pre-period trend patterns to be examined for DPC and Standard plan enrollees separately. Difference-in-differences analysis requires examination of trends in the separate groups before the treatment or change of interest begins.

The first step of the difference-in-differences analysis was to graph trends over time of the number of visits per member per month. If trends were parallel, the effect of plan choice on specialist visits was determined directly from the multiple linear regression. The key difference-in-differences assumption is that DPC participants would experience the same trends in visits as Standard plan participants, after conditioning on observable characteristics.

Dependent variable

Number of specialist visits per person per month was the dependent variable. A specialist was defined as a provider who is not a primary care provider; a specialist does not need to be a physician. In general, a specialist visit included all services provided by the specialist to the patient on one day and were intended to include observational visits as well as other in-office visits. Specialist visits were included as a continuous count variable.

A specialist visit was comprised of all records with the same patient ID, provider ID, claim ID, and service date. Certain types of specialists, such as counselors, may have submitted batches of visits as a single claim (multiple service dates with the same patient ID, provider ID and claim ID); such claims were separated into multiple visits, consistent with other claims data research (Scerbo 2001). Also, claims in which a specialist provider did not provide direct patient care in an office visit (radiologist, pathologist, or anesthesiologist) were not considered specialist visits as the patient did not interact with or have a visit with the provider (Kapur, Joyce et al. 2000). Whether the number of visits per exposure unit differed significantly between members in the DPC plan and members in the Standard plan was examined.

Independent variables

The primary independent variable was *plan type,* either DPC or Standard plan, determined monthly.

The multiple linear regression for difference-in-differences used a dichotomous time variable (pre- or post-period in reference to when DPC was first available for the 7/1/2015 effective date) and a dichotomous plan variable for DPC or Standard plan, analogous to treatment and control group, respectively.

Independent variables were selected based on statistically significant relationships with plan choice (as presented in Chapter 2) and any additional variables available at the member level that were expected to be significantly related to specialist visits. Variables included enrollee age, race/ethnicity, chronic conditions, usual source of care (USC), and member age. With the exception of member age, all independent variables were defined the same way in this study as they were defined for the selection study (Chapter 2). Race, presence of chronic condition(s) and USC were defined at the family level, as explained in Chapter 2. A family had a USC if any family member saw the same primary care provider more than once in the pre-period. A family had a chronic condition if any family member had any of the Office of the Assistant Secretary for Health (OASH) conditions. Race/ethnicity (black, white or other) was only available for people employed in the group in the pre-period, and chronic conditions and USC were defined at the family level based on claims in the pre-period. Enrollee age was defined as the age of the employee on July 1, 2015, when the DPC plan option was first available, and it was categorized as younger than 45 years old, or 45 years old and older as explained in Chapter 2. Member age, available for employees and dependents for the entire study period, was operationalized as year of birth (YOB) so that it had the same value

throughout the study period. Member age is significantly related to health care utilization and expenditures broadly. Older patients tend to use more health care and have higher expenditures, all else equal (Alemayehu and Warner 2004, Starfield, Chang et al. 2009, Lassman, Hartman et al. 2014).

3.3 Results

Table 3.1 presents enrollments and specialist visits by quarter over the full study period for all members that made an election for the plan year beginning July 1, 2015. The number of members enrolled in each plan increased each quarter in the pre-period (from 2014 Q1 to 2015 Q2). At the beginning of the post-period (2015 Q3) about 36% of members (employees and dependents) were enrolled in the DPC option. By the end of the post-period (2018 Q3) about 54% of members were enrolled in the DPC option. Total enrollment grew by 14% over the post-period; DPC plan enrollment increased by 71% and the Standard plan shrank by 18% from 2015 Q3 to 2018 Q3.

Table 3.1 Specialist Visits, All Members

	Member Months			Specialist Visits		Spec Visits/1,000 MMs	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC
2014 Q1	3,119	1,516	32.7%	400	145	128.2	95.6
2014 Q2	3,219	1,559	32.6%	476	144	147.9	92.4
2014 Q3	3,371	1,577	31.9%	259	139	76.8	88.1
2014 Q4	3,447	1,627	32.1%	373	207	108.1	127.2
2015 Q1	3,568	1,693	32.2%	466	182	130.6	107.5
2015 Q2	3,694	1,844	33.3%	561	162	151.9	87.9
2015 Q3	3,719	2,065	35.7%	211	313	56.6	151.6
2015 Q4	3,647	2,238	38.0%	446	285	122.3	127.3
2016 Q1	3,564	2,376	40.0%	471	376	132.2	158.0
2016 Q2	3,452	2,512	42.1%	583	415	168.9	165.2
2016 Q3	3,257	2,756	45.8%	242	392	74.3	142.2
2016 Q4	3,279	2,836	46.4%	348	459	106.1	161.8
2017 Q1	3,344	2,877	46.2%	522	559	156.1	194.1
2017 Q2	3,316	2,959	47.2%	611	463	184.3	156.3
2017 Q3	3,206	3,055	48.8%	209	452	65.2	148.0
2017 Q4	3,206	3,127	49.4%	453	502	141.3	160.4
2018 Q1	3,221	3,232	50.1%	479	596	148.7	184.3
2018 Q2	3,184	3,305	50.9%	613	542	192.5	164.0
2018 Q3	3,057	3,522	53.5%	214	557	70.0	158.0

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 3.1 shows specialist visits per 1,000 member months by plan for all members over the study period. Table 3.1 and Figure 3.1 represent the same members over the same time period. Specialist visits for Standard plan members exhibited a noticeable seasonality pattern, peaking in April or May, which corresponds to members maximizing the benefit of having met their annual deductible by utilizing more specialist visits before the plan year ends June 30 (Barrett 2008). Specialist visits for Standard plan members varied more later in the study period, with higher highs and lower lows. Specialist visits were trending up over the study

period for both DPC and Standard plan members, the trend line was steeper for DPC than Standard.

Figure 3.1 Specialist Visits per 1,000 Member Months, All Members, Full Study Period (Jan 2014-Sept 2018)

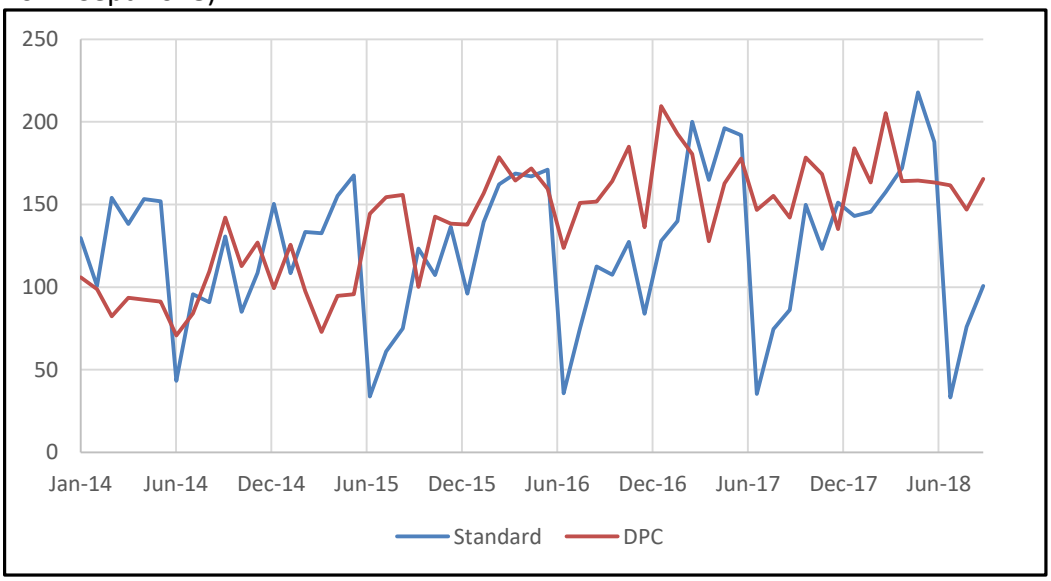


Table 3.2 represents enrollments and specialist visits over the study period for members of the full analysis cohort. Figure 3.2 and Table 3.2 represent the same members over the same time period. The trend lines for the full analysis cohort in Figure 3.2 showed the same characteristics as those of all members as shown in Figure 3.1, including the seasonality pattern of Standard members and the relatively steeper trend line for DPC.

Table 3.2 Specialist Visits, Full Analysis Cohort

	Member Months			Specialist Visits		Spec Visits/1,000 MMs	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC
2014 Q1	2,830	1,368	32.6%	364	113	128.6	82.6
2014 Q2	2,913	1,415	32.7%	433	117	148.6	82.7
2014 Q3	3,018	1,455	32.5%	227	129	75.2	88.7
2014 Q4	3,018	1,455	32.5%	315	200	104.2	137.5
2015 Q1	3,018	1,455	32.5%	396	164	131.2	112.7
2015 Q2	3,018	1,455	32.5%	508	131	168.3	90.0
2015 Q3	2,948	1,526	34.1%	180	261	60.9	171.0
2015 Q4	2,904	1,569	35.1%	389	212	134.0	135.1
2016 Q1	2,829	1,647	36.8%	415	283	146.7	171.5
2016 Q2	2,782	1,694	37.8%	515	284	185.1	167.7
2016 Q3	2,583	1,773	40.7%	200	280	77.4	157.9
2016 Q4	2,510	1,765	41.3%	284	300	113.1	170.0
2017 Q1	2,444	1,755	41.8%	450	373	184.1	212.3
2017 Q2	2,365	1,720	42.1%	523	301	221.1	174.7
2017 Q3	2,229	1,755	44.1%	174	293	78.1	167.0
2017 Q4	2,180	1,734	44.3%	355	332	162.8	191.2
2018 Q1	2,133	1,716	44.6%	373	390	174.9	227.0
2018 Q2	2,055	1,714	45.5%	430	335	209.2	195.4
2018 Q3	1,945	1,742	47.2%	164	334	84.3	191.4

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 3.2 Specialist Visits per 1,000 Member Months, Full Analysis Cohort, Full Study Period (Jan 2014-Sept 2018)

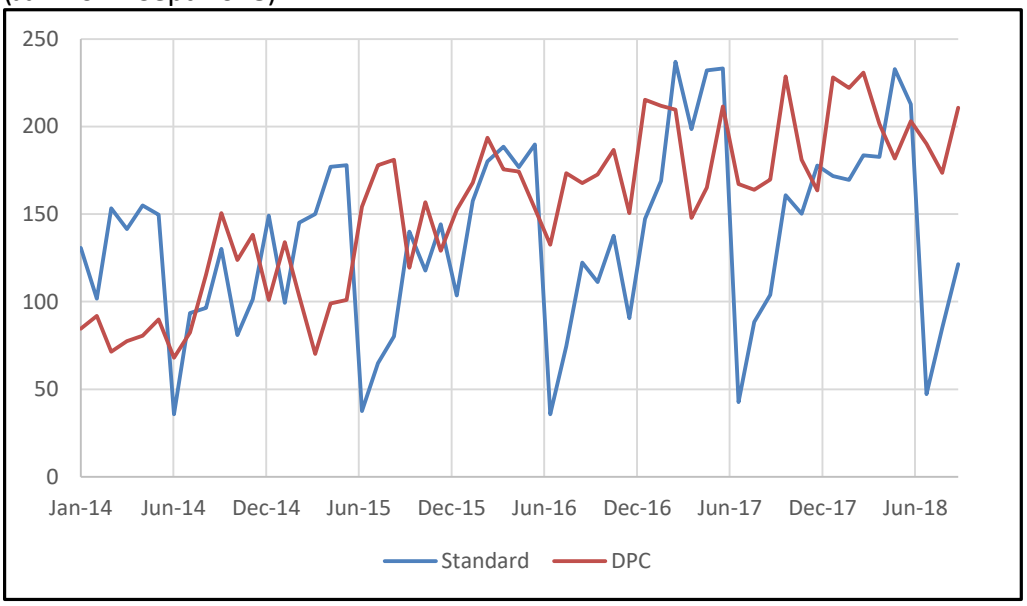


Table 3.3 presents the comparisons of averages in the pre- and post-periods for all members and shows statistically significant differences in specialist visits between the DPC and Standard plans. In the pre-period, the percentage of members with any specialist visit and specialist visits per 1,000 member months are statistically significantly lower for DPC than for Standard plan members. In the post-period, DPC is statistically significantly higher than Standard for percent of members with any specialist visit and number of specialist visits per 1,000 member months.

Table 3.3 Summary Statistics, All Members

	Pre-period			Post-period		
	Jan 2014 - June 2015			July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
Exposures (member months)	19,948	10,060		43,451	36,860	
Members *	1,216	649		1,755	1,538	
Average plan exposure (months)	16.4	15.5		24.8	24.0	
Specialist visits	2,477	983		5,402	5,908	
Members with any Specialist visit(s)	497	214		739	715	
% of Members with any Spec visit(s) **	40.9%	33.0%	<0.0001	42.1%	46.5%	<0.0001
Specialist visits per 1,000 exposures	124.1	97.7	0.0001	124.3	160.3	<0.0001

Members who lapsed coverage before July 2015 are excluded

* Data is at the member, time period (pre or post) and plan level (DPC or Standard)

** Portion with any visits in the period (pre or post)

Table 3.4 presents the same summaries as Table 3.3, but for the full analysis cohort rather than all members. The same patterns appear in Table 3.4 as in Table 3.3. In the pre-period, DPC members have lower specialist visits per 1,000 member months and lower portion of members with any specialist visit than Standard members. In the post-period, both measures are higher for DPC than Standard, and all four comparisons are statistically significant.

Table 3.4 Summary Statistics, Full Analysis Cohort

	Pre-period Jan 2014 - June 2015			Post-period July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
Exposures (member months)	17,455	8,963		31,449	18,164	
Members *	985	506		985	506	
Average plan exposure (months)	17.7	17.7		31.9	35.9	
Specialist visits	2,215	882		4,368	3,125	
Members with any Specialist visit(s)	430	189		525	322	
% of Members with any Spec visit(s) **	43.7%	37.4%	0.0001	53.3%	63.6%	<0.0001
Specialist visits per 1,000 exposures	126.9	98.4	<0.0001	138.9	172.0	<0.0001

Members who lapsed coverage before July 2015 are excluded

* Data is at the member, time period (pre or post) and plan level (DPC or Standard)

** Portion with any visits in the period (pre or post)

Difference-in-differences analysis began with an examination of trends in the pre-period. Figure 3.3 is a subset of Figure 3.2, showing trends in the pre-period (January 2014 through June 2015) by plan. In the pre-period, both DPC and Standard plan showed an increasing trend of specialist visits per 1,000 member months, and trends are parallel. No formal statistical test for parallel trends exists for the difference-in-differences method.

Figure 3.3 Specialist Visits per 1,000 Member Months, Full Analysis Cohort, Pre-Period (Jan 2014 – June 2015)

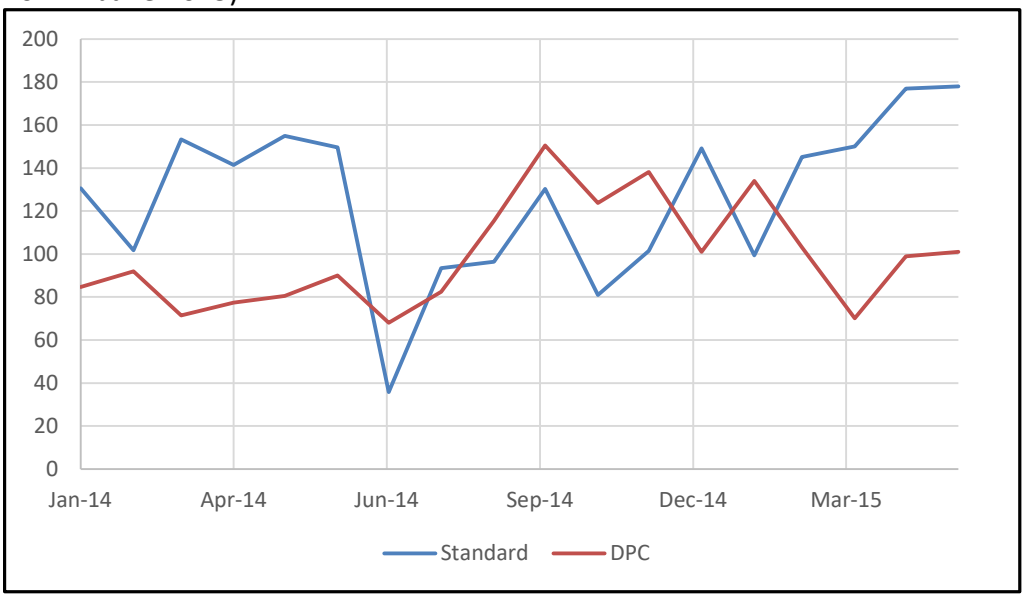


Table 3.5 presents difference-in-differences results for specialist visits for the full analysis cohort, unadjusted for control variables. For ease of comparison with tables 3.2 and 3.4, utilization estimates are shown per 1,000 member months. From pre-to post-period, specialist visits increased 73.6 per 1,000 member months for DPC (172.0-98.4) and increased 11.1 per 1,000 member months for Standard (138.9-126.9). The difference-in-differences result is that visits for DPC members increased 61.6 visits per 1,000 member months more than Standard members increased; the result is statistically significant.

Table 3.5 Unadjusted Regression of Specialist Visits, Full Analysis Cohort

Difference in Differences Effect of DPC on Specialist Visits				
Time (t)	**Intervention (i)**	**Estimate ***	**SE**	**p-value**
1	1	172.0		
1	0	138.9		
0	1	98.4		
0	0	126.9		
	Effect t * i	**61.6**	**0.0179**	**0.0006**

* Estimates are shown per 1,000 member months

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

Table 3.6 presents difference-in-differences results for specialist visits for the full analysis cohort, adjusted for control variables. For ease of comparison with tables 3.2 and 3.4, utilization estimates are shown per 1,000 member months. The number of specialist visits was statistically significantly associated with member age (year of birth), chronic condition(s) in the family, usual source of care in the family, and other race/ethnicity (not black or white). For each year of age, members had 3.2 fewer specialist visits per 1,000 member months. Members in families with a usual source of care had 62.3 more specialist visits per 1,000 member months than members in families without. Members in families with one or more chronic conditions had 50.4 more visits per 1,000 member months than members in families without. Members in families in which the employee was not black or white had 65.8 fewer visits per 1,000 member months. After controlling for variables related to plan choice or utilization, DPC specialist visits increased 74.5 visits per 1,000 member months from the pre-period to the post-period (129.8-55.3); Standard plan specialist visits increased 13 visits per 1,000 member months from pre- to post-period (69.9-56.9). The effect of DPC on specialist visits, then, is 61.4 visits per 1,000 member months (74.5-13.0); specialist visits for those in the DPC plan increased by about 61.4

visits per 1,000 more than specialist visits in the Standard plan. This result was statistically significant with p=0.0006.

The difference-in-differences estimate of the effect of DPC on specialist visits is large compared to the average number of visits per 1,000 member months. In the adjusted analysis (Table 3.6), the effect of DPC (61.6) was of the same order of magnitude as the estimates of pre-period Standard members (56.9), pre-period DPC (55.3) and post-period Standard (69.9) when control variables were included.

Table 3.6 Regression of Specialist Visits, Full Analysis Cohort

	Estimate *	SE	p-value
Member Year of Birth	-3.2	0.0004	<.0001
Family Usual Source of Care (ref=none)	62.3	0.0178	0.0005
Family Number of Chronic Conditions			
One or more (ref=none)	50.4	0.0142	0.0004
Enrollee Race/Ethnicity			
Black (ref=white)	-16.9	0.0216	0.4340
Other (ref=white)	-65.8	0.0159	<.0001
Enrollee Age 45+ (ref=<45)	-5.8	0.0149	0.6998

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on Specialist Visits, with Control Variables

Time (t)	Intervention (i)	Estimate *	SE	p-value
1	1	129.8		
1	0	69.9		
0	1	55.3		
0	0	56.9		
	Effect t * i	**61.4**	**0.0178**	**0.0006**

* Estimates are shown per 1,000 member months

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

3.4 Discussion

This study made an important contribution to the literature as it examined the utilization of employees and dependents in the real world, in an employee medical benefit situation with choice between two options that differ only in elements related to primary care delivery. Importantly, families that enrolled in the DPC option were required to change primary care providers.

Contrary to expectations, specialist visits were significantly higher in DPC than in the Standard plan in this study, and the effect was large compared to the average number of visits; the additional specialist visits with DPC were on the same order of magnitude as the number of visits of Standard plan members (in both pre- and post-periods) and as DPC members in the pre-period, after controlling for member age, USC and CCs in the family, and enrollee race/ethnicity in the difference-in-differences analysis. Unadjusted results told the same story; percent of members with any specialist visit and specialist visits per 1,000 member months were statistically significantly lower for DPC than Standard in the pre-period and statistically significantly higher in the post-period. Control variables that were statistically significant and had large effect sizes compared to average number of visits per exposure unit include usual source of care in the family, chronic condition(s) in the family and other race/ethnicity.

Two considerations warrant further discussion here as they may be important for better understanding the impact of DPC on specialist visits in a dual choice employer setting, and this study did not allow for their examination. One is that all members who selected DPC necessarily were new patients to the DPC practice, that is, they had to switch physicians to obtain primary care services paid for by the plan they chose. In contrast, most Standard enrollees continued to

receive primary care services as established patients. The second consideration is that the difference-in-differences approach used a single post-period; DPC members were defined as those who selected DPC at the first opportunity (for the plan year beginning July 1, 2015). This approach did not recognize members who switched to DPC after the first opportunity as DPC members of a later time period. Uptake of a new type of plan does not likely happen all at once. The phenomena of members choosing DPC after the first opportunity was seen clearly in tables of all members.

Members who elected DPC at any point were new patients to the DPC practice. At any primary care practice, new patient visits include a comprehensive exam and history, while established patient visits are likely less comprehensive and may be focused on a single problem. Specialist referrals are more likely to be generated by a new patient visit than by an established patient visit (Hill 2003, Baker, Bundorf et al. 2014). Most Standard plan members continued existing relationships with their current primary care providers, although some level of churn among primary care providers is not uncommon. A larger portion of new patients among DPC visits may have contributed to the higher rate of specialist visits in DPC, although this hypothesis was not tested in this study. Additionally, the extent to which specialist visits will be higher as new patients and any chronic conditions or initial concerns are evaluated and subsequently lower once these patients are stabilized and established with the DPC practice is not known.

Enrollment patterns by plan differed considerably once the new option was offered to employees of this large group. It was perhaps not surprising that enrollments in the new option increased in the years after its introduction; such a result may have indicated that the option

was well-received and co-workers were talking to each other about their experience, which could have led to additional enrollments in the new plan in subsequent years. Some evidence suggests that the impact of DPC on specialist visits may vary over time periods after the first opportunity to enroll in DPC. First, enrollment shifted substantially from the Standard plan to the DPC plan in the first few years. Other studies have found, similarly, that uptake of a new type of plan happens gradually over the first few years; many members are initially hesitant to switch due to switching costs, as well as cognitive misperceptions and psychological biases such as status quo bias, regret avoidance and anchoring (Samuelson 1988, Cutler, Lincoln et al. 2010).

How the study period and full analysis cohort were defined may have obscured the results that will eventually emerge for this employer group. In particular, new entrants to the plan may choose differently than existing participants since no option is in the status quo position for them (Samuelson 1988). Second, other studies show that utilization changes over the first few years after switching plans, due to the learning curve of new members and other factors (Parente, Feldman et al. 2004, Tollen, Ross et al. 2004, Tchernis, Normand et al. 2006).

Alternatively, it may be that this DPC practice did not necessarily incentivize fewer specialty visits. When a DPC practice is contracted with an employer to provide primary care services to a portion of their employee and dependent population, they may focus more on preventing expensive services such as emergency department and other hospital services, and less on preventing specialist visits. For example, an internet search for marketing materials of the DPC company yielded one document, which emphasizes care coordination with specialists and says that patients can keep their existing pediatrician and specialists (Paladina 2019). (Note

that only one marketing document was found because the DPC company was sold in 2018 and subsequently changed its marketing name.) While this is not conclusive, it suggests that the DPC company may not prioritize reducing specialist visits.

This study contained several limitations in addition to the considerations discussed above. While it was a rigorous study of the effect of DPC on specialist visits, and the first study of its kind for this model of primary care delivery, it only examined the effect of DPC for the employees and dependents of one large employer, for members participating at the time DPC was first offered. As such, one should be cautious about applying its findings to other employer groups in other parts of the country where employee behavior and underlying health care delivery factors, such as quality and availability of primary care, may vary from the group studied here. In addition, this method cannot determine the impact of DPC practice philosophy regarding specialty referrals for new patients on the number of specialist visits for DPC members compared to Standard members, as discussed above.

Chronic condition and usual source of care variables were defined at the family level based on claims data in the pre-period. No concerns were raised about claim data accuracy or completeness with initial data validations or any data work done in this study. Different definitions or operationalization of variables, however, could have led to somewhat different or more nuanced results. Particularly with the size of the effects of chronic condition and usual source of care variables on specialist visits, it may be worthwhile to consider alternate definitions of the chronic condition variable in future research.

Factors that may affect the DPC practice's approach to specialty referrals and scope of practice are not known. In particular, if the practice markets their services to employers and

brokers as reducing total expenditures through improved access to primary care, it seems likely that the practice would focus primarily on reducing or avoiding the most expensive types of utilization, including hospitalization and emergency department visits. In the absence of knowledge about the practice's goals regarding specialty referrals, it is not possible to draw conclusions about whether the increase in specialist visits that is found in this study reflects positively on the practice's efforts.

3.5 Conclusions

Direct primary care potentially offers improved access to primary care services, broader scope of practice and improved comprehensiveness; it seems to offer the potential to lower health care expenditures by reducing unnecessary care downstream of primary care. However, DPC may not necessarily lower the utilization of all types of care downstream of primary care. In this study, specialist visits increased significantly in DPC compared to the Standard plan. A DPC practice that exclusively serves an employer or one in which the majority of the patient panel is employees and dependents of employers contracted with the DPC practice, may focus on lowering spending overall rather than minimizing every type of downstream utilization.

Future studies should consider that members who choose DPC in a dual choice employer medical benefit offering will necessarily change physicians; new patients likely experience different specialty referral patterns than established patients. A better understanding of the long-term effects of employer sponsored DPC options on health care utilization also requires research that examines plan switching and specialty utilization over time. The next study examined emergency department and urgent care center visits by plan.

3.6 Works Cited

ACP (2006). The Impending Collapse of Primary Care Medicine and Its Implications for the State of the Nation's Health Care. Philadelphia, PA, the American College of Physicians.

Alemayehu, B. and K. E. Warner (2004). "The lifetime distribution of health care costs." Health Serv Res **39**(3): 627-642.

Arndt, B. G., J. W. Beasley, M. D. Watkinson, J. L. Temte, W. J. Tuan, C. A. Sinsky and V. J. Gilchrist (2017). "Tethered to the EHR: Primary Care Physician Workload Assessment Using EHR Event Log Data and Time-Motion Observations." Ann Fam Med **15**(5): 419-426.

Baker, L. C., M. K. Bundorf, A. B. Royalty and Z. Levin (2014). "Physician practice competition and prices paid by private insurers for office visits." JAMA **312**(16): 1653-1662.

Barnett, M. L., Z. R. Song and B. E. Landon (2012). "Trends in Physician Referrals in the United States, 1999-2009." Archives of Internal Medicine **172**(2): 163-170.

Barrett, J. (2008). Timing's Everything: The Impact of Benefit Rush. Health Watch, Society of Actuaries.

Bazemore, A., S. Petterson, L. E. Peterson and R. L. Phillips, Jr. (2015). "More Comprehensive Care Among Family Physicians is Associated with Lower Costs and Fewer Hospitalizations." Ann Fam Med **13**(3): 206-213.

Bazemore, A. W., S. Petterson, N. Johnson, I. M. Xierali, R. L. Phillips, J. Rinaldo, J. C. Puffer and L. A. Green (2011). "What services do family physicians provide in a time of primary care transition?" J Am Board Fam Med **24**(6): 635-636.

Bodenheimer, T. and H. H. Pham (2010). "Primary care: current problems and proposed solutions." Health Aff (Millwood) **29**(5): 799-805.

Bodenheimer, T. and C. Sinsky (2014). "From triple to quadruple aim: care of the patient requires care of the provider." Ann Fam Med **12**(6): 573-576.

Burdi, M. D. and L. C. Baker (1999). "Physicians' perceptions of autonomy and satisfaction in California." Health Aff (Millwood) **18**(4): 134-145.

Cassel, C. K. and J. A. Guest (2012). "Choosing wisely: helping physicians and patients make smart decisions about their care." JAMA **307**(17): 1801-1802.

Colwill, J. M., J. J. Frey, M. A. Baird, J. W. Kirk and W. W. Rosser (2016). "Patient Relationships and the Personal Physician in Tomorrow's Health System: A Perspective from the Keystone IV Conference." J Am Board Fam Med **29 Suppl 1**: S54-59.

Cutler, D., B. Lincoln and R. Zeckhauser (2010). "Selection stories: understanding movement across health plans." J Health Econ **29**(6): 821-838.

Donaldson, M., Yordy, K., Lohr, K., Vanselow, N. (1996). Primary Care: America's Health in a New Era. Washington DC, National Academy Press.

Dugdale, D. C., R. Epstein and S. Z. Pantilat (1999). "Time and the patient-physician relationship." J Gen Intern Med **14 Suppl 1**: S34-40.

Ellis, R. P. and T. G. McGuire (1986). "Provider behavior under prospective reimbursement. Cost sharing and supply." J Health Econ **5**(2): 129-151.

Erickson, S. M., B. Rockwern, M. Koltov, R. M. McLean, P. Medical and P. Quality Committee of the American College of (2017). "Putting Patients First by Reducing Administrative Tasks

in Health Care: A Position Paper of the American College of Physicians." Ann Intern Med **166**(9): 659-661.
Forrest, C. B., P. A. Nutting, S. von Schrader, C. Rohde and B. Starfield (2006). "Primary care physician specialty referral decision making: patient, physician, and health care system determinants." Med Decis Making **26**(1): 76-85.
Franks, P., C. M. Clancy and P. A. Nutting (1992). "Gatekeeping revisited--protecting patients from overtreatment." N Engl J Med **327**(6): 424-429.
Franks, P. and K. Fiscella (1998). "Primary care physicians and specialists as personal physicians. Health care expenditures and mortality experience." J Fam Pract **47**(2): 105-109.
Friedberg, M. W., P. G. Chen, C. White, O. Jung, L. Raaen, S. Hirshman, E. Hoch, C. Stevens, P. B. Ginsburg, L. P. Casalino, M. Tutty, C. Vargo and L. Lipinski (2015). "Effects of Health Care Payment Models on Physician Practice in the United States." Rand Health Q **5**(1): 8.
Gray, B. H., K. Stockley and S. Zuckerman (2012). "American primary care physicians' decisions to leave their practice: evidence from the 2009 commonwealth fund survey of primary care doctors." J Prim Care Community Health **3**(3): 187-194.
Green, L. A. and J. C. Puffer (2016). "Reimagining Our Relationships with Patients: A Perspective from the Keystone IV Conference." J Am Board Fam Med **29 Suppl 1**: S1-S11.
Grumbach, K. and T. Bodenheimer (2002). "A primary care home for Americans: putting the house in order." JAMA **288**(7): 889-893.
Harrold, L. R., T. S. Field and J. H. Gurwitz (1999). "Knowledge, patterns of care, and outcomes of care for generalists and specialists." J Gen Intern Med **14**(8): 499-511.
HCCI (2018). 2016 Health Care Cost and Utilization Report, Health Care Cost Institute.
Hill, E. (2003). "Understanding When to Use the New Patient E/M Codes." from https://www.aafp.org/pubs/fpm/issues/2003/0900/p33.html.
Jollis, J. G., E. R. DeLong, E. D. Peterson, L. H. Muhlbaier, D. F. Fortin, R. M. Califf and D. B. Mark (1996). "Outcome of acute myocardial infarction according to the specialty of the admitting physician." N Engl J Med **335**(25): 1880-1887.
Kapur, K., G. F. Joyce, K. A. Van Vorst and J. J. Escarce (2000). "Expenditures for physician services under alternative models of managed care." Med Care Res Rev **57**(2): 161-181.
Kushnir, T., D. Greenberg, N. Madjar, I. Hadari, Y. Yermiahu and Y. G. Bachner (2014). "Is burnout associated with referral rates among primary care physicians in community clinics?" Fam Pract **31**(1): 44-50.
Kushnir, T., J. Kushnir, A. Sarel and A. H. Cohen (2011). "Exploring physician perceptions of the impact of emotions on behaviour during interactions with patients." Family Practice **28**(1): 75-81.
Lassman, D., M. Hartman, B. Washington, K. Andrews and A. Catlin (2014). "US health spending trends by age and gender: selected years 2002-10." Health Aff (Millwood) **33**(5): 815-822.
Levine, J. S. (2004). "Trust: can we create the time?" Arch Intern Med **164**(9): 930-932.
Macinko, J., B. Starfield and L. Shi (2003). "The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998." Health Serv Res **38**(3): 831-865.
Mechanic, D., D. D. McAlpine and M. Rosenthal (2001). "Are patients' office visits with physicians getting shorter?" N Engl J Med **344**(3): 198-204.

Mehrotra, A., C. B. Forrest and C. Y. Lin (2011). "Dropping the baton: specialty referrals in the United States." Milbank Q **89**(1): 39-68.

Mitchell, J. B., D. J. Ballard, J. P. Whisnant, C. J. Ammering, G. P. Samsa and D. B. Matchar (1996). "What role do neurologists play in determining the costs and outcomes of stroke patients?" Stroke **27**(11): 1937-1943.

Morrison, I. and R. Smith (2000). "Hamster health care." BMJ **321**(7276): 1541-1542.

Okie, S. (2012). "The evolving primary care physician." N Engl J Med **366**(20): 1849-1853.

Paladina, H. (2019). Paladina Overview Flyer for Colorado Division of Human Resources, Paladina Health.

Palumbo, R. (2017). "Keeping candles lit: The role of concierge medicine in the future of primary care." Health Serv Manage Res **30**(2): 121-128.

Parente, S. T., R. Feldman and J. B. Christianson (2004). "Evaluation of the effect of a consumer-driven health plan on medical care expenditures and utilization." Health Serv Res **39**(4 Pt 2): 1189-1210.

Peikes, D., E. F. Taylor, A. S. O'Malley and E. C. Rich (2020). "The Changing Landscape Of Primary Care: Effects Of The ACA And Other Efforts Over The Past Decade." Health Aff (Millwood) **39**(3): 421-428.

Pham, H. H., D. Schrag, A. S. O'Malley, B. Wu and P. B. Bach (2007). "Care patterns in Medicare and their implications for pay for performance." N Engl J Med **356**(11): 1130-1139.

Phillips, R. L., Jr., P. A. Pugno, J. W. Saultz, M. L. Tuggy, J. M. Borkan, G. S. Hoekzema, J. E. DeVoe, J. A. Weida, L. E. Peterson, L. S. Hughes, J. E. Kruse and J. C. Puffer (2014). "Health is primary: Family medicine for America's health." Ann Fam Med **12 Suppl 1**: S1-S12.

Phillips, W. R. and D. G. Haynes (2001). "The domain of family practice: Scope, pole, and function." Family Medicine **33**(4): 273-277.

Rosenthal, M. B. and R. G. Frank (2006). "What is the empirical basis for paying for quality in health care?" Medical Care Research and Review **63**(2): 135-157.

Samuelson, W., Zeckhauser, R. (1988). "Status quo bias in decision making." Journal of Risk and Uncertainty.

Scerbo, M., Dickstein, C., Wilson, A. (2001). Health Care Data and SAS. Cary, NC, SAS Institute, Inc.

Schaum, K. D. (2013). "When is a "new" patient "not new"?" Adv Skin Wound Care **26**(7): 305-306.

Schimpff, S. C. (2014). "Solving the crisis in primary care. Direct pay models could buy physicians more time with patients to improve care and reset a fractured payment system." Med Econ **91**(16): 30, 32-33.

Shortell, S. M., T. M. Waters, K. W. Clarke and P. P. Budetti (1998). "Physicians as double agents: maintaining trust in an era of multiple accountabilities." JAMA **280**(12): 1102-1108.

Sinsky, C., L. Colligan, L. Li, M. Prgomet, S. Reynolds, L. Goeders, J. Westbrook, M. Tutty and G. Blike (2016). "Allocation of Physician Time in Ambulatory Practice: A Time and Motion Study in 4 Specialties." Ann Intern Med **165**(11): 753-760.

Smetana, G. W., B. E. Landon, A. B. Bindman, H. Burstin, R. B. Davis, J. Tjia and E. C. Rich (2007). "A comparison of outcomes resulting from generalist vs specialist care for a single

discrete medical condition: a systematic review and methodologic critique." Arch Intern Med **167**(1): 10-20.
Sommers, L. S., T. W. Hacker, D. M. Schneider, P. A. Pugno and J. B. Garrett (2001). "A descriptive study of managed-care hassles in 26 practices." West J Med **174**(3): 175-179.
Starfield, B. (1994). "Is primary care essential?" Lancet **344**(8930): 1129-1133.
Starfield, B. (1997). "Outcome of acute myocardial infarction according to the specialty of the admitting physician." N Engl J Med **336**(22): 1607; author reply 1608-1609.
Starfield, B. (2008). "Access, primary care, and the medical home: rights of passage." Med Care **46**(10): 1015-1016.
Starfield, B., H. Y. Chang, K. W. Lemke and J. P. Weiner (2009). "Ambulatory specialist use by nonhospitalized patients in us health plans: correlates and consequences." J Ambul Care Manage **32**(3): 216-225.
Starfield, B., L. Shi, A. Grover and J. Macinko (2005). "The effects of specialist supply on populations' health: Assessing the evidence." Health Affairs **24**(3): W97-W107.
Starfield, B., L. Shi and J. Macinko (2005). "Contribution of primary care to health systems and health." Milbank Q **83**(3): 457-502.
Strauss, M. J., D. Conrad, J. P. LoGerfo, L. D. Hudson and M. Bergner (1986). "Cost and outcome of care for patients with chronic obstructive lung disease. Analysis by physician specialty." Med Care **24**(10): 915-924.
Tchernis, R., S. L. Normand, J. Pakes, P. Gaccione and J. P. Newhouse (2006). "Selection and plan switching behavior." Inquiry **43**(1): 10-22.
Thom, D. H., M. A. Hall and L. G. Pawlson (2004). "Measuring patients' trust in physicians when assessing quality of care." Health Aff (Millwood) **23**(4): 124-132.
Tollen, L. A., M. N. Ross and S. Poor (2004). "Risk segmentation related to the offering of a consumer-directed health plan: a case study of Humana Inc." Health Serv Res **39**(4 Pt 2): 1167-1188.
Valderas, J. M., B. Starfield, C. B. Forrest, B. Sibbald and M. Roland (2009). "Ambulatory care provided by office-based specialists in the United States." Ann Fam Med **7**(2): 104-111.
Zuvekas, S. H. and J. W. Cohen (2016). "Fee-For-Service, While Much Maligned, Remains The Dominant Payment Method For Physician Visits." Health Aff (Millwood) **35**(3): 411-414.

Chapter 4: Urgent Care Center and Emergency Department Visits

Emergency departments and urgent care centers both offer episodic care, which lacks the continuity, coordination, and comprehensiveness that characterize high quality primary care; high quality primary care is associated with improved patient and population health (Starfield, Shi et al. 2005). The state of the U.S. emergency medical care system has been a policy priority since the Institute of Medicine created the Committee on the Future of Emergency Care in the United States in 2003 and published three extensive reports in 2007, including *Emergency Medical Services: At the Crossroads,* and *Hospital-based Emergency Care: At the Breaking Point* (IOM 2007, IOM 2007). Given the policy priority of reducing emergency department utilization and the association of urgent care centers and urgent care center utilization with inadequate primary care access, it is important to determine whether Direct Primary Care has the potential to reduce urgent care center and emergency department utilization among a commercially insured population.

Direct Primary Care (DPC) is a financing and delivery model in which patients (or employers) pay directly for care via a membership model. The median self-pay adult DPC fee was $75 per month in 2020 and the median monthly DPC fee paid by an employer for a family of four in 2021 was $158 (HintHealth 2023). DPC physicians provide unlimited access to a defined set of primary care services, including coordination and navigation services. DPC models have the potential to reduce health care spending for a number of reasons. They do not accept payment from insurance companies or other third-party payers, which frees up their time for patient care and prompts them to more fully embrace an agency/fiduciary role with their customer patients. With a full panel of roughly 25% of the patients of a traditional insurance-based primary care physician (PCP), DPC physicians may have more availability than

their traditional counterparts. Early results reported by DPC practices seem to indicate the model may hold promise for improving patient outcomes and lowering overall health care expenditures. Yet, most of the information on DPC benefits is anecdotal and superficial. Currently, there are no peer-reviewed studies comparing patient outcomes in DPC and traditional primary care delivery that have been published. It is important to conduct this research to determine whether DPC is associated with improved patient outcomes and lower health care expenditures. As perhaps the single most important goal of any health care initiative or alternative payment model, it is critical to evaluate whether DPC can lower overall health care spending.

Direct Primary Care (DPC) has the potential to lower health care costs by reducing unnecessary care through emergency department visits, urgent care center visits, and other care. Emergency Department (ED) and Urgent Care Center (UCC) visits often result from non-emergency factors including lack of adequate access to primary care (Trzeciak and Rivers 2003, Ionescu-Ittu, McCusker et al. 2007, Weinick, Bristol et al. 2009, Cheung, Wiler et al. 2012). This paper aims to determine whether DPC affects the number of ED and UCC visits when employees had a choice between a DPC option and a Standard option for medical benefits.

DPC may affect ED and UCC visits for at least two reasons. One possible effect is that DPC patients who experience an acute, unscheduled need may be less likely to seek care in an ED or UCC because they have after-hours access to their DPC physician. A second possible effect is that over time, DPC patients experience improved chronic condition management due to increased time with their physician, continuity of care (Grembowski, Schaefer et al. 2014, Gruneir, Bronskill et al. 2016, Cole 2018) and improved doctor-patient relationship (Musich,

Wang et al. 2016, Pereira Gray, Sidaway-Lee et al. 2018). DPC patients with chronic conditions may experience fewer symptom exacerbations that lead to ED or UCC visits (Bodenheimer, Wagner et al. 2002, Ionescu-Ittu, McCusker et al. 2007).

4.1 Literature Review

Emergency departments are designed to address urgent medical emergencies in which the patient is unstable or suffering a problem that could be life-threatening if appropriate care is not received quickly. Typically, EDs offer 24-hour care and are attached to a hospital so that patients can be admitted directly if there is a need for surgery or other critical intervention. Emergency department crowding, generally defined as a situation in which needs for ED services exceed available resources in the ED considering both physical space and appropriate personnel, is a pervasive problem that threatens public health (IOM 2007, Kenny, Chang et al. 2020).

ED crowding is seen as a failing of the health care system as it indicates that many patients lack adequate insurance, preventive care or chronic condition management, and that some communities lack alternative sites of care (Trzeciak and Rivers 2003, O'Malley 2005, IOM 2007). ED visits are increasing faster than population growth, which may indicate that primary care access barriers continue to persist. Between 1993 and 2003, the US population grew by 12% and ED visits grew by 26% (IOM 2007). Recently, numerous initiatives have aimed to reduce unnecessary ED utilization, as emergency care is very expensive, inappropriate ED visits may lead to unnecessary testing and treatment (Uscher-Pines, Pines et al. 2013), and ED overcrowding and long wait times are associated with lower quality and safety for patients (Dharshi 2006, Taylor 2006, Pines and Hollander 2008, Love, Murphy et al. 2012).

Numerous initiatives have aimed to reduce ED visits using various approaches. Most initiatives focus either on reducing ED visits among a small population of high utilizers or on reducing low-acuity visits broadly. Many initiatives are focused on specific populations, such as Medicaid or Veterans Health Administration beneficiaries; some are focused on reducing ED visits for specific concerns such as visits after bariatric surgery. The effectiveness of the initiatives is not well-understood. A recent systematic review was unable to establish that most types of initiatives are effective and without adverse consequences such as increases in hospital admissions or mortality; the exception was case management initiatives, which were found to lower frequent ED use, based on three small studies (Raven, Kushel et al. 2016). There was insufficient data to examine cost effectiveness in that review.

The ED is an expensive care setting and ED spending growth accounts for the largest share of hospital outpatient spending growth. Between 2012 and 2016, ED expenditures per person increased 34% (the average price of a visit increased 31% and the number of visits increased 2%) (HCCI 2018). An ED visit is roughly ten times the cost of a UCC visit with the same diagnosis (Weinick, Bristol et al. 2009, Ho, Metcalfe et al. 2017). Estimates of the portion of ED visits that are unnecessary or avoidable range from 27% of a general population to 71% of a commercially insured population under age 65 (Weinick, Burns et al. 2010, Truven 2013). It has been estimated that $4.4 billion could potentially be saved annually if ED visits amenable to treatment in retail clinics or UCCs were handled in those alternate settings (Weinick, Burns et al. 2010). Still, it is not clear that the growth of UCCs and UCC visits lowers overall expenditures since UCC visits may substitute for less expensive care (primary care visits and home

management) as well as more expensive ED visits (Yee 2013, Chang, Brundage et al. 2015, Wang, Mehrotra et al. 2021).

Structural barriers to timely primary care are associated with increased total ED utilization (Cheung, Wiler et al. 2011, Cheung, Wiler et al. 2012) and increased non-urgent ED utilization (CHCF 2006, Hefner, Wexler et al. 2015) and barriers are increasing (Berry-Millett, Bandara et al. 2009, Cheung, Wiler et al. 2011). Structural barriers to primary care access include lack of after-hours access, inability to reach the primary care practice on the phone, long waits for appointments or care, and difficulty finding a physician who is accepting new patients. Higher continuity of primary care is associated with lower ED utilization (Ionescu-Ittu, McCusker et al. 2007, Hefner, Wexler et al. 2015, Yoon, Cordasco et al. 2015).

UCCs were created as an alternative, more affordable option to EDs in an attempt to provide less expensive and more convenient care for non-urgent needs and thereby lower spending and improve patient satisfaction. UCCs are less technologically sophisticated than EDs and are designed to treat problems that are less serious; they offer same day ambulatory health care for non-emergent, non-life- and non-limb-threatening illnesses and injuries during hours of operation (UCA 2019); they offer services not typically available in a primary care office, such as X-rays, intravenous fluids and minor trauma repair (Weinick 2007). UCCs first opened in the 1980s and experienced considerable growth starting in the mid-1990s (Weinick 2007); UCCs numbered about 9,600 nationally in 2019 (Poyorena, Patel et al. 2022). Codes for urgent care centers were added to the health care common procedure coding system in 2002 (HCPCSdata). Scholars have pointed out the need for additional research on UCCs (Allen, Cummings et al. 2021).

UCCs are becoming increasingly popular, with 50-100 new UCCs opening each year (Poyorena, Patel et al. 2022). Long waits for primary care appointments and long wait times to be seen in the emergency department are contributing to the growth of UCCs and UCC visits since the mid-1990s (Weinick 2007, Weinick, Bristol et al. 2009, Poyorena, Patel et al. 2022). From 2008 to 2015, UCC visits for low-acuity conditions increased 119% (Poon, Schuur et al. 2018).

Although UCCs were originally created to address high costs of ED visits, it is unclear whether increased use of UCCs lowers spending overall (Chang, Brundage et al. 2015, Allen, Cummings et al. 2021, Wang, Mehrotra et al. 2021). While an ED visit is roughly ten times the cost of a UCC visit, one study found that between twenty-seven and thirty-seven UCC visits were required to avoid one low-acuity ED visit, which suggests that on balance higher utilization of UCCs may increase expenditures (Wang, Mehrotra et al. 2021).

Yet, UCCs are similar in many ways to primary care offices and their patients resemble primary care patients more than ED patients (Weinick, Bristol et al. 2009). UCC visits substitute for primary care visits and home management as well as low-acuity ED visits. Relative to EDs, shorter wait times and convenience reduce the non-financial costs of UCC visits, which may increase the number of visits if patients otherwise would have stayed at home rather than seeking care (Chang, Brundage et al. 2015, Wang, Mehrotra et al. 2021).

DPC seems to hold promise for lowering expenditures by lowering utilization of services downstream of primary care. Data reported in 2010 by DPC practice Qliance showed DPC patients experienced 35% fewer hospitalizations, 65% fewer emergency department visits, 66% fewer specialist visits, and 82% fewer surgeries compared to regional benchmarks (Page 2013).

However, reliable and valid research remains scarce. For instance, the Qliance results were self-published and were not subjected to the scrutiny and rigor of publication in peer-reviewed academic journals.

Although evidence about patient outcomes in DPC is quite limited, similar models provide evidence of potential DPC benefits. MD VIP, a personalized primary care delivery model with strong similarities to DPC in terms of much smaller panels and much increased access to primary care than is found in traditional insurance-based primary care, has shown significantly lower expenditures, ED and UCC visits and use of other downstream care. Members with MD VIP were statistically significantly less likely to have any ED visit or any UCC visit compared to matched controls in one study (Musich, Wang et al. 2016) and had statistically significantly lower ED visits in another study (Musich, Klemes et al. 2014).

Appropriate same day and 24/7 access to the DPC physician, and responsiveness to phone, email and text inquiries may prevent ED and UCC visits for lower-acuity reasons. In addition, DPC patients may experience improved health from appropriate same day and 24/7 access to their DPC physician with whom they have built a trusting relationship over time. DPC office visits of 30 minutes or more are typical (Chase 2013, Carlson 2015), particularly when establishing a new patient or working through many concerns. DPC patients may be less likely to have issues that warrant care in the ED or UCC if their concerns have been addressed in a timely and satisfactory manner all along. Since the possible reasons that DPC may reduce ED and UCC visits are varied and may affect both urgent and non-urgent visits, it is important to examine the ability of DPC to reduce the total number of ED and UCC visits, rather than focusing only on lower acuity or non-urgent visits.

4.2 Data and Methodology

Data for this study came from a large employer group, a county in North Carolina, that started offering a Direct Primary Care health benefit option for the plan year that began on July 1, 2015. Nine hundred thirty-six employees made a medical benefit election for the 2015 plan year. Before the DPC option was added to the group's benefit offering, one plan was offered, and that plan (which will be referred to as the Standard plan) has continued to be offered unchanged. Both the DPC and the Standard options have the same benefits for non-primary care services and the employee portion of premium does not vary by plan. The DPC option and the Standard option are the same for elements related to non-primary care services and for financial elements such as premiums and out of pocket costs. DPC is provided at a site near the county's office by a DPC company that specializes in dedicated near-site and on-site clinics for large employers. Members who select the DPC option must change primary care providers.

Data included enrollment and claims data from January 2014 through December 2018. Data were reported and analyzed through 2018 Q3 to allow three additional months for claims to be processed and reported.

The measures of interest in this paper were number of ED visits per unit of exposure (1,000 member months) and number of UCC visits per unit of exposure. It examined whether the number of visits per exposure unit differed significantly between members in the DPC plan and members in the Standard plan. Studies of health care utilization commonly define exposures as 1,000 member months (Tollen, Ross et al. 2004, Wright, Anderson et al. 2021).

Analytic method

Analyses were done at the individual person level. The main analyses used a multiple linear regression difference-in-differences approach to determine the impact of having DPC on ED and UCC visits, adjusting for control variables. One advantage of a difference-in-differences approach is that unobservable differences between people who choose DPC and people who do not are essentially canceled out in the process of differencing post- and pre-periods.

Descriptive tables showed members enrolled in medical benefits at any time on or after July 1, 2015. Members who were covered in the medical benefit plan prior to July 2015 and who did not continue coverage into the plan year beginning July 1, 2015, were not included in the descriptive tables or any of the analysis in this paper. Descriptive tables showed enrollments and visits by quarter. Summary statistics shown include percentage of members with any UCC or ED visit and number of visits per unit of exposure (1,000 member months). Two- tailed t-tests were done to determine whether summary statistics for DPC and Standard plan members were statistically significantly different in the pre- and post-periods.

Difference-in-differences analysis was conducted on members continuously enrolled in medical benefits from July 2014 through June 2016, one year before and after DPC plan choice was first offered; these members were referred to as the full analysis cohort. In the pre-period, members were categorized according to the plan they selected for the plan year beginning July 1, 2015. This allowed pre-period trend patterns to be examined for DPC and Standard plan enrollees separately. Difference-in-differences analysis requires examination of trends in the separate groups before the treatment or change of interest begins.

Enrollment in employer group benefits can change monthly as employees join and leave employment and as dependent enrollment changes due to life events such as birth, death,

marriage, divorce, and changes in benefits available to a spouse or domestic partner due to their employment. In addition, all employees have an opportunity to change their benefit election annually during the open enrollment period.

The use of the full analysis cohort, a stable cohort of members who were enrolled in the medical benefit from July 2014 through June 2016, removed the problems of group instability that could have troubled the interpretation of a difference in difference analysis of all members. Interpretation of analysis conducted on all members could be problematic; the impacts of members moving into and out of coverage over the study period could obscure the effects of plan choice on ED and UCC visits. In particular, members joining the group and choosing the DPC option in the post-period would be expected to look different than members continuing coverage from the pre-period into the post-period and members joining the group and the Standard option in the post-period. Upon choosing the DPC option, the member is a new patient at the DPC practice; new patient visits look different than existing patient visits and certain types of care (e.g. specialist visits) may be more frequent as a new patient is established than is usual for a similar existing patient (Schaum 2013). All descriptive and summary tables were done for all members and separately for the full analysis cohort.

The first step of the difference-in-differences analysis was to graph pre-period trends over time of the number of visits per member per month for members of the full analysis cohort. The key difference-in-differences assumption was that DPC participants would experience the same trends in visits as Standard plan participants, after conditioning on observable characteristics. If trends were parallel, the effect of plan choice on visits was determined directly from the multiple linear regression.

Analyses were conducted separately for ED and UCC visits due to their different levels of capabilities, different degree to which they are affected by primary care access, and the likely substitution effects between them.

Dependent variables

Dependent variables for the separate analyses were *number of ED visits* and *number of UCC visits*. Number of ED and UCC visits per person per month over the study period were included as continuous count variables.

Independent variables

The primary independent variable was *plan type,* either DPC or Standard plan, determined monthly in the post period, as enrollees could switch between plans annually during open enrollment (July effective date) or when the family experienced a qualifying life event.

The multiple linear regression for difference-in-differences used a dichotomous time variable (pre- or post-period in reference to when DPC was first available for the July 1, 2015 effective date) and a dichotomous plan variable for DPC or Standard plan, analogous to treatment and control group, respectively.

Independent variables were selected based on statistically significant relationships with plan choice (as presented in Chapter 2) and any additional variables available at the member level that were expected to be significantly related to the number of ED and UCC visits. Variables included enrollee age, race, chronic conditions, usual source of care (USC), and member age. With the exception of member age, all independent variables were defined the same way in this study as they were defined for the selection study (Chapter 2). Race, presence

of chronic condition(s) and USC were defined at the family level, as explained in Chapter 2. A family had a USC if any family member saw the same primary care provider more than once in the pre-period. A family had a chronic condition if any family member had any of the Office of the Assistant Secretary for Health (OASH) conditions. Race/ethnicity (black, white or other) was only available for people employed in the group in the pre-period, and chronic conditions and USC were defined at the family level based on claims in the pre-period. Enrollee age was defined as the age of the employee on July 1, 2015, when the DPC plan option was first available, and it was categorized as younger than 45 years old, or 45 years old and older as explained in Chapter 2. Member age, available for employees and dependents for the entire study period, was operationalized as year of birth (YOB) so that it had the same value throughout the study period. Member age is significantly related to health care utilization and expenditures broadly. Older patients tend to use more health care and have higher expenditures, all else equal (Alemayehu and Warner 2004, Starfield, Chang et al. 2009, Lassman, Hartman et al. 2014).

4.3 Results

Table 4.1 represents enrollment, emergency department and urgent care center visits in the study period for all members. The DPC option was first offered for the benefit year beginning July 1, 2015. The pre-period was 2014 Q1 through 2015 Q2; the post-period was 2015 Q3 through 2018 Q3. The number of members enrolled in each plan increased each quarter from 2014 Q1 to 2015 Q2. At the beginning of the post-period (2015 Q3) about 36% of members (employees and dependents) were enrolled in the DPC option. By the end of the post-period (2018 Q3) about 54% of members were enrolled in the DPC option. Overall, total

enrollment in medical benefits grew by 14% over the post-period; DPC plan enrollment increased by about 71% and the Standard plan shrank by about 18% from 2015 Q3 to 2018 Q3.

For most quarters, UCC visits per 1,000 member months are lower for DPC than for the Standard plan members; DPC is lower for 5 of 6 quarters in the pre-period and ten of thirteen quarters in the post-period. In the pre-period, ED visits per 1,000 member months are lower for DPC than the Standard plan for 4 of 6 quarters; in the post-period, DPC is lower for nine of thirteen quarters. UCC visits are generally higher in the winter and lower in the summer. This seasonality pattern has been observed in other papers (Batal, Tench et al. 2001, UCA 2019).

Table 4.1 Urgent Care Center Visits and Emergency Department Visits, All Members

	Member Months			UCC Visits		UCC Visits/1,000 MMs		ED Visits		ED Visits/1,000 MMs	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC	Standard	DPC	Standard	DPC
2014 Q1	3,038	1,523	33.4%	43	23	14.2	15.1	34	21	11.2	13.8
2014 Q2	3,138	1,571	33.4%	46	22	14.7	14.0	42	24	13.4	15.3
2014 Q3	3,291	1,628	33.1%	17	7	5.2	4.3	53	26	16.1	16.0
2014 Q4	3,371	1,683	33.3%	44	17	13.1	10.1	41	20	12.2	11.9
2015 Q1	3,492	1,751	33.4%	60	30	17.2	17.1	70	30	20.0	17.1
2015 Q2	3,618	1,904	34.5%	54	18	14.9	9.5	59	21	16.3	11.0
2015 Q3	3,719	2,065	35.7%	11	10	3.0	4.8	36	25	9.7	12.1
2015 Q4	3,647	2,238	38.0%	38	15	10.4	6.7	63	30	17.1	13.4
2016 Q1	3,564	2,376	40.0%	46	19	12.9	7.8	62	27	17.3	11.4
2016 Q2	3,452	2,512	42.1%	46	21	13.2	8.4	69	44	20.0	17.5
2016 Q3	3,257	2,756	45.8%	27	20	8.3	7.3	53	32	16.3	11.6
2016 Q4	3,279	2,836	46.4%	33	21	10.1	7.4	43	35	13.0	12.3
2017 Q1	3,344	2,877	46.2%	75	24	22.4	8.3	63	41	18.8	14.3
2017 Q2	3,316	2,959	47.2%	52	27	15.5	9.1	65	46	19.6	15.5
2017 Q3	3,206	3,055	48.8%	13	36	4.1	11.8	39	37	12.2	12.1
2017 Q4	3,206	3,127	49.4%	38	33	11.9	10.4	48	57	14.8	18.2
2018 Q1	3,221	3,232	50.1%	61	48	18.9	14.9	49	47	15.2	14.5
2018 Q2	3,184	3,305	50.9%	75	32	23.6	9.5	50	53	15.7	16.0
2018 Q3	3,057	3,522	53.5%	7	33	2.3	9.4	32	45	10.5	12.8

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 4.1 UCC Visits per 1,000 Member Months, All Members, Full Study Period (Jan 2014-Sept 2018)

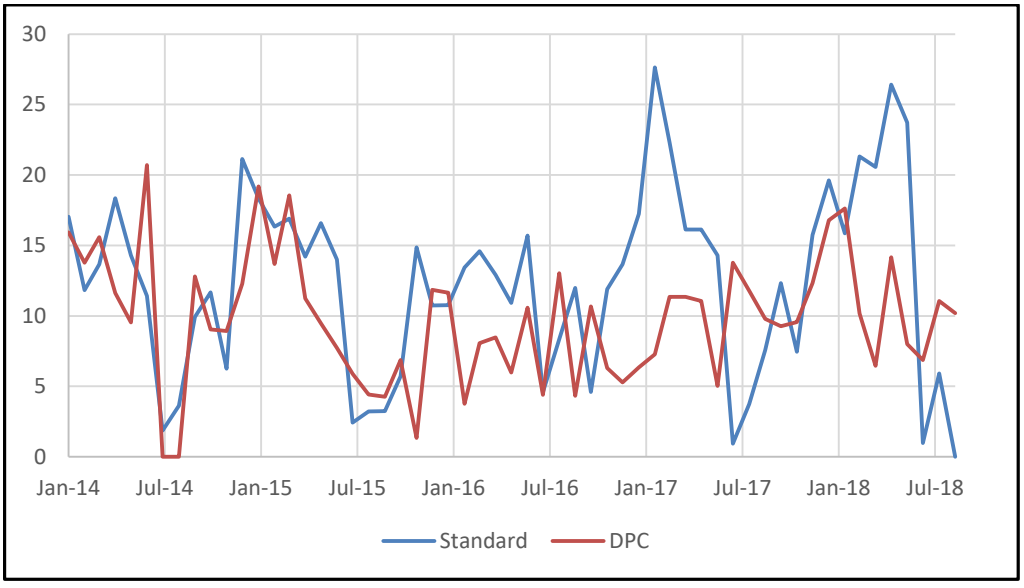


Figure 4.2 ED Visits per 1,000 Member Months, All Members, Full Study Period (Jan 2014 - Sept 2018)

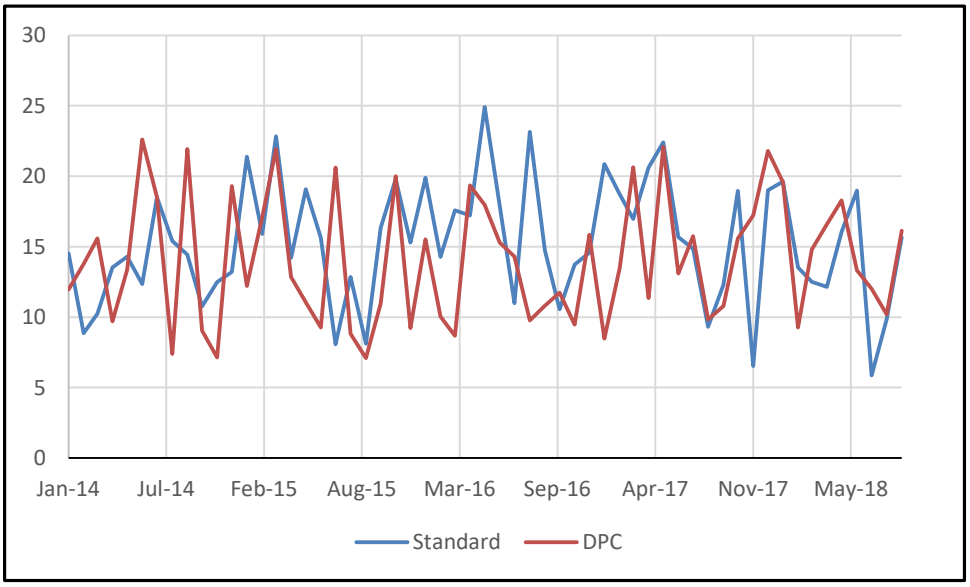


Table 4.2 represents enrollment, emergency department and urgent care center visits for members of the full analysis cohort. That is, Table 4.2 shows only those members enrolled from July 2014 through June 2016, and it shows the number of visits for these members over the entire study period. Members shown in Table 4.2 were included in the main (difference-in-differences) analysis.

At the beginning of the post-period (2015 Q3) about 34% of the full analysis cohort (members shown in Table 4.2) were enrolled in the DPC option. By the end of the post-period (2018 Q3) about 40% were enrolled in the DPC option. The full analysis cohort declined about 29% over the study period; DPC enrollment declined by about 17% and Standard plan enrollment declined by about 36%. This cohort was a closed group created as a stable group for the main analysis of this study. Members could leave the cohort after June 30, 2016 by leaving the group entirely (e.g. no longer working for the employer) or by switching plans. In the post-

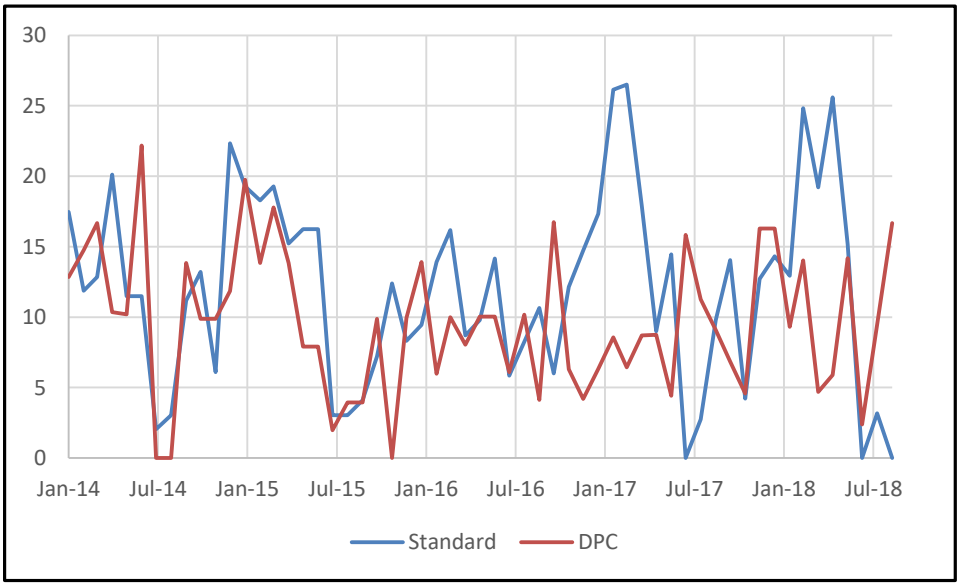
period, those leaving the group or switching plans were more likely to have initially enrolled in the Standard plan.

Table 4.2 Urgent Care Center Visits and Emergency Department Visits, Full Analysis Cohort

	Member Months			UCC Visits		UCC Visits/1,000 MMs		ED Visits		ED Visits/1,000 MMs	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC	Standard	DPC	Standard	DPC
2014 Q1	2,776	1,422	33.9%	39	21	14.0	14.8	28	18	10	13
2014 Q2	2,859	1,469	33.9%	41	21	14.3	14.3	36	19	13	13
2014 Q3	2,955	1,518	33.9%	16	7	5.4	4.6	51	25	17	16
2014 Q4	2,955	1,518	33.9%	41	16	13.9	10.5	27	18	9	12
2015 Q1	2,955	1,518	33.9%	56	26	19.0	17.1	52	20	18	13
2015 Q2	2,955	1,518	33.9%	47	15	15.9	9.9	42	15	14	10
2015 Q3	2,948	1,518	34.0%	10	5	3.4	3.3	27	19	9	13
2015 Q4	2,901	1,515	34.3%	27	10	9.3	6.6	46	21	16	14
2016 Q1	2,815	1,504	34.8%	37	15	13.1	10.0	46	16	16	11
2016 Q2	2,757	1,494	35.1%	30	14	10.9	9.4	52	24	19	16
2016 Q3	2,550	1,467	36.5%	21	10	8.2	6.8	49	16	19	11
2016 Q4	2,471	1,432	36.7%	27	13	10.9	9.1	39	12	16	8
2017 Q1	2,403	1,408	36.9%	56	10	23.3	7.1	44	21	18	15
2017 Q2	2,321	1,371	37.1%	32	10	13.8	7.3	51	26	22	19
2017 Q3	2,179	1,326	37.8%	9	16	4.1	12.1	33	14	15	11
2017 Q4	2,130	1,306	38.0%	22	12	10.3	9.2	32	24	15	18
2018 Q1	2,079	1,288	38.3%	36	17	17.3	13.2	31	14	15	11
2018 Q2	2,001	1,273	38.9%	40	11	20.0	8.2	36	16	18	13
2018 Q3	1,895	1,262	40.0%	2	12	1.1	9.5	21	11	11	9

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 4.3 UCC Visits per 1,000 Member Months, Full Analysis Cohort, Full Study Period (Jan 2014-Sept 2018)



Patterns of UCC and ED visits in Table 4.2 were similar to those in Table 4.1. For most quarters, UCC visits per 1,000 member months for the full analysis cohort was lower for DPC than for the Standard plan; DPC was lower for 5 of 6 quarters in the pre-period and eleven of thirteen quarters in the post-period. In the pre-period, ED visits per 1,000 member months for the full analysis cohort was lower for DPC than the Standard plan for 3 of 6 quarters; in the post-period, DPC was lower for eleven of thirteen quarters.

Table 4.3 Summary Statistics, All Members

	Pre-period			Post-period		
	Jan 2014 - June 2015			July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
Exposures (member months)	19,948	10,060		43,451	36,860	
Members *	1,216	649		1,755	1,538	
Average plan exposure (months)	16.4	15.5		24.8	24.0	
UCC visits	264	117		521	338	
Members with any UCC visit(s)	161	74		310	221	
% of Members with any UCC visit(s) **	13.2%	11.4%	0.2493	17.7%	14.4%	0.0001
UCC visits per 1,000 exposures	8.1	11.6	0.2598	7.1	9.2	0.0003
ED visits	299	142		670	519	
Members with any ED visit(s)	192	91		343	253	
% of Members with any ED visit(s) **	15.8%	14.0%	0.2901	19.5%	16.4%	0.0071
ED visits per 1,000 exposures	15.0	14.1	0.6029	15.4	14.1	0.2000

Members who lapsed coverage before July 2015 are excluded

* Data is at the member, time period (pre or post) and plan level (DPC or Standard)

** Portion with any visits in the period (pre or post)

Table 4.3 presents summary statistics comparing DPC and Standard plan members in the pre-and post-periods. As the pre-period spanned 18 months and the post-period spanned 39 months, comparisons were only done within time periods; data from the pre-period were not compared to those from the post-period. In the pre-period, members were characterized by the plan they elected for July 2015. In the post-period, plan enrollment was determined by month. Members who lapsed coverage before July 2015 were excluded. For both the pre-period and the post-period, DPC members were enrolled for a slightly shorter period of time on average than Standard members.

For both UCC and ED visits in both pre- and post-periods, DPC members had fewer visits per exposure unit (1,000 member months) than Standard members; the differences were

statistically significant (at the 5% level) only for UCC visits in the post-period. For both UCC and ED visits in both pre- and post-periods, the portion of members with any visit was lower for DPC than Standard members; the difference was statistically significant (at the 5% level) only for ED visits in the post-period).

Table 4.4 Summary Statistics, Full Analysis Cohort

	Pre-period			**Post-period**		
	Jan 2014 - June 2015			July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
Exposures (member months)	17,455	8,963		31,449	18,164	
Members *	985	506		985	506	
Average plan exposure (months)	17.7	17.7		31.9	35.9	
UCC visits	240	106		349	155	
Members with any UCC visit(s)	142	64		208	99	
% of Members with any UCC visit(s) **	14.4%	12.6%	0.1862	21.1%	19.6%	0.0009
UCC visits per 1,000 exposures	13.7	11.8	0.2113	11.1	8.5	0.0087
ED visits	236	115		507	234	
Members with any ED visit(s)	152	77		245	119	
% of Members with any ED visit(s) **	15.4%	15.2%	0.3397	24.9%	23.5%	0.0028
ED visits per 1,000 exposures	13.5	12.8	0.6869	16.1	12.9	0.0184

Members who lapsed coverage before July 2015 are excluded

* Data is at the member, time period (pre or post) and plan level (DPC or Standard)

** Portion with any visits in the period (pre or post)

Table 4.4 Summary Statistics, Full Analysis Cohort

	Pre-period			Post-period		
	Jan 2014 - June 2015			July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
Exposures (member months)	17,455	8,963		31,449	18,164	
Members *	985	506		985	506	
Average plan exposure (months)	17.7	17.7		31.9	35.9	
UCC visits	240	106		349	155	
Members with any UCC visit(s)	142	64		208	99	
% of Members with any UCC visit(s) **	14.4%	12.6%	0.1862	21.1%	19.6%	0.0009
UCC visits per 1,000 exposures	13.7	11.8	0.2113	11.1	8.5	0.0087
ED visits	236	115		507	234	
Members with any ED visit(s)	152	77		245	119	
% of Members with any ED visit(s) **	15.4%	15.2%	0.3397	24.9%	23.5%	0.0028
ED visits per 1,000 exposures	13.5	12.8	0.6869	16.1	12.9	0.0184

Members who lapsed coverage before July 2015 are excluded

* Data is at the member, time period (pre or post) and plan level (DPC or Standard)

** Portion with any visits in the period (pre or post)

Table 4.4 shows the same statistics as Table 4.3, but for the full analysis cohort rather than all members. Average plan exposure was slightly longer for DPC members than Standard members for both the pre- and post-periods.

For both UCC and ED visits in both pre- and post-periods, the portion of members with any visit was lower for DPC than Standard members; the differences were not statistically significant at the 5% level for either plan or either time period.

For both UCC and ED visits in both pre- and post-periods, DPC members had fewer visits per exposure unit than Standard members; the differences were statistically significant (at the 5% level) for both UCC and ED visits in the post-period. That is, before controlling for member age, presence of chronic condition(s) in the family, and other variables related to plan choice or

number of ED or UCC visits, in the post-period, the number of UCC and ED visits per exposure unit for DPC enrollees were statistically significantly lower than for Standard plan enrollees.

The first step of the difference-in-differences method was to examine trends in the pre-period and determine whether they were parallel for DPC and Standard plan members. Figure 4.5 presents pre-period trend of UCC visits per exposure unit for full analysis cohort members who elected DPC compared to those who elected the Standard plan. Both plans exhibited the same seasonality pattern, with the lowest utilization in Q3, and otherwise were very similar with overall trend over the pre-period being nearly flat.

Figure 4.5 UCC Visits per 1,000 Member Months, Full Analysis Cohort, Pre-Period (Jan 2014-June 2015)

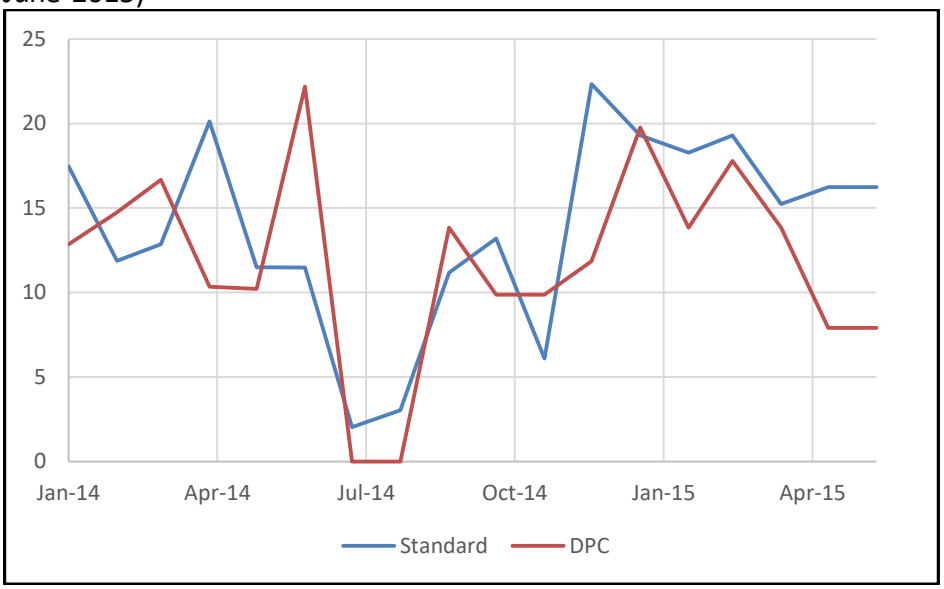


Figure 4.6 ED Visits per 1,000 Member Months, Full Analysis Cohort, Pre-Period (Jan 2014-June 2015)

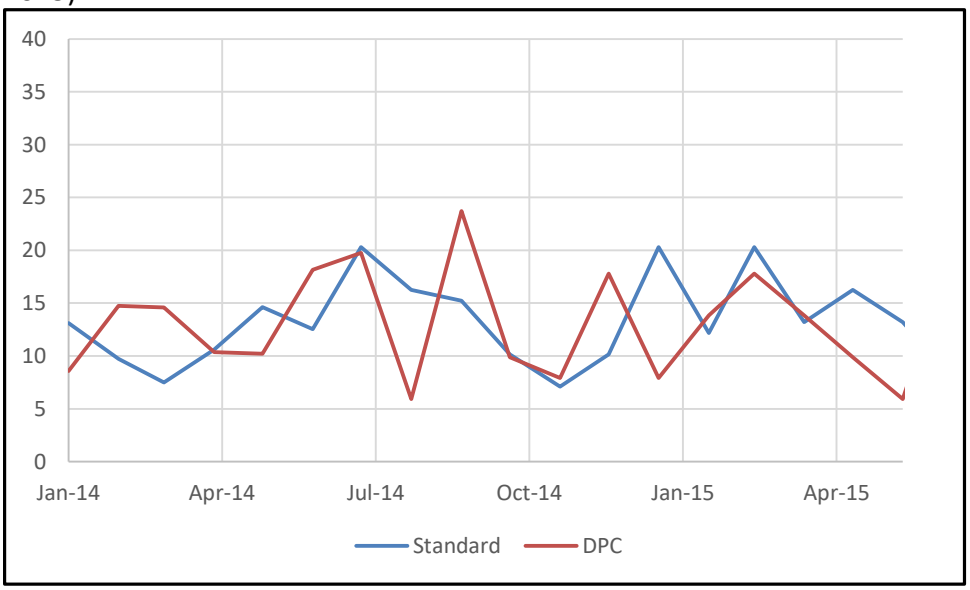


Figure 4.6 presents pre-period trend of ED visits per exposure unit for full analysis cohort members who elected DPC compared to those who elected the Standard plan. Overall trend over the pre-period is very similar with both plans being nearly flat. Both UCC and ED visits per unit of exposure in the full analysis cohort were parallel in the pre-period for purposes of difference-in-differences analysis. No formal statistical test for parallel trends for difference-in-differences exists.

Table 4.5 presents difference-in-differences results for UCC visits for the full analysis cohort, unadjusted for control variables. For ease of comparison with tables 2 and 4, utilization estimates are shown per 1,000 member months. From pre-to post-period, UCC visits decreased 3.3 per 1,000 member months for DPC (i.e., 11.8 to 8.5) and decreased 2.7 per 1,000 member months for Standard (i.e., 13.8 to 11.1). The difference-in-differences result is that visits for DPC

members decreased 0.7 visits per 1,000 member months more than Standard members decreased; the result is not statistically significant.

Table 4.5 Unadjusted Regression of Urgent Care Center Visits, Full Analysis Cohort

Difference in Differences Effect of DPC on UCC Visits				
Time (t)	**Intervention (i)**	**Estimate ***	**SE**	**p-value**
1	1	8.5		
1	0	11.1		
0	1	11.8		
0	0	13.8		
	Effect t * i	**-0.7**	**0.0023**	**0.7704**

* Estimates are shown per 1,000 member months

Table 4.6 shows difference-in-differences results for UCC visits for the full analysis cohort adjusted for control variables. For ease of comparison with Tables 4.2 and 4.4, utilization estimates are shown per exposure unit. Member age (year of birth) was statistically significantly associated (at the 5% level) with UCC visits; for each year of age, members had 0.20 additional UCC visits per unit of exposure. Members in families with one or more chronic conditions had 3.4 more UCC visits per unit of exposure than members in families without chronic conditions, and this result was significant at the 5% level. Compared to estimates of the number of UCC visits per unit of exposure (which range from 6.5 for post-period DPC to 11.6 for pre-period Standard), the effect of chronic conditions in the family, 3.4, is large. Differences by other control variables were not statistically significant.

After controlling for member age and number of chronic conditions in the family, UCC visits for DPC decreased by 3.4 per 1,000 member months from pre- to post-period (6.5-9.9) and Standard plan members decreased UCC visits by 2.7 per 1,000 member months from pre-to post-period (8.9-11.6). The difference-in-differences effect of DPC on UCC visits was that, after

controlling for variables related to plan choice or number of visits, DPC lowered UCC visits by 0.7 visits per 1,000 member months, but this result was not statistically significant.

Table 4.6 Regression of Urgent Care Center Visits, Full Analysis Cohort

	Estimate *	SE	p-value
Member Year of Birth	0.2	0.0000	<.0001
Family Usual Source of Care (ref=none)	2.9	0.0019	0.1172
Family Number of Chronic Conditions			
One or more (ref=none)	3.4	0.0014	0.0158
Enrollee Race/Ethnicity			
Black (ref=white)	-1.3	0.0020	0.5216
Other (ref=white)	-1.0	0.0026	0.7106
Enrollee Age 45+ (ref=<45)	-1.6	0.0017	0.3506

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on UCC Visits, with Control Variables

Time (t)	Intervention (i)	Estimate *	SE	p-value
1	1	6.5		
1	0	8.9		
0	1	9.9		
0	0	11.6		
	Effect t * i	**-0.7**	**0.0023**	**0.7697**

* Estimates are shown per 1,000 member months

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

Table 4.7 presents difference-in-differences results for ED visits for the full analysis cohort, unadjusted for control variables. For ease of comparison with tables 4.2 and 4.4, utilization estimates are shown per 1,000 member months. From pre-to post-period, ED visits increased 0.1 per 1,000 member months for DPC (12.9-12.8) and increased 2.6 per 1,000 member months for Standard (16.1-13.5). The difference-in-differences result is that ED visits for DPC members increased 2.6 visits per 1,000 member months less than Standard members increased; the result is not statistically significant.

Table 4.7 Unadjusted Regression of Emergency Department Visits, Full Analysis Cohort

Difference in Differences Effect of DPC on ED Visits				
Time (t)	**Intervention (i)**	**Estimate ***	**SE**	**p-value**
1	1	12.9		
1	0	16.1		
0	1	12.8		
0	0	13.5		
	Effect t * i	**-2.6**	**0.0023**	**0.2582**

* Estimates are shown per 1,000 member months

Table 4.8 shows difference-in-differences results for ED visits for the full analysis cohort, adjusted for control variables. For ease of comparison with Tables 4.2 and 4.4, utilization estimates are shown per exposure unit. Members in families with one or more chronic conditions had 11.2 more ED visits per unit of exposure than members in families without chronic conditions, and this result was significant at the 5% level. Compared to estimates of the number of ED visits per unit of exposure (which range from 11.5 for pre-period Standard to 14.2 for post-period Standard), the effect of chronic conditions in the family, 11.5, is quite large. Differences by other control variables were not statistically significant.

After controlling for member age and number of chronic conditions in the family, ED visits for DPC increased by 0.1 per 1,000 member months from pre- to post-period (12.6-12.5) and Standard plan members increased ED visits by 2.7 per 1,000 member months from pre-to post-period (14.2-11.5). The difference-in-differences effect of DPC on ED visits was that, after controlling for variables related to plan choice or utilization, DPC lowered ED visits by 2.5 visits per 1,000 member months, but this result was not statistically significant.

Table 4.8 Regression of Emergency Department Visits, Full Analysis Cohort

	Estimate *	SE	p-value
Member Year of Birth	-0.1	0.0001	0.5169
Family Usual Source of Care (ref=none)	-0.7	0.0062	0.9123
Family Number of Chronic Conditions			
One or more (ref=none)	11.2	0.0030	0.0002
Enrollee Race/Ethnicity			
Black (ref=white)	-2.8	0.0025	0.2705
Other (ref=white)	-1.2	0.0030	0.6827
Enrollee Age 45+ (ref=<45)	-1.2	0.0037	0.7491

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on ED Visits, with Control Variables

Time (t)	Intervention (i)	Estimate *	SE	p-value
1	1	12.6		
1	0	14.2		
0	1	12.5		
0	0	11.5		
	Effect t * i	**-2.5**	**0.0023**	**0.2669**

* Estimates are shown per 1,000 member months

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

4.4 Discussion

This current study provides some evidence that DPC may be able to lower ED and UCC visits in a commercially insured population in which employees are offered choice between a DPC plan and another plan. However, the main (difference-in-differences) analysis did not show that DPC statistically significantly lowered ED or UCC visits compared to Standard plan members among members participating when DPC was first offered, controlling for variables associated with plan choice or utilization. This is consistent with a recent systematic review that concluded most initiatives to reduce ED visits are not effective and without adverse consequences (Raven, Kushel et al. 2016). Many initiatives that aim to reduce ED visits focus on Medicare, Medicaid,

or uninsured patients; fewer studies have examined ED or UCC visits among members of a commercially insured population. One study of MD VIP, a personalized primary care model very similar to DPC, showed statistically significantly lower probability of any ED visit or any UCC visit compared to traditional primary care for a study population that was about 90% commercially insured and less than 65 years old (Musich, Wang et al. 2016). Similar to the current study, the MD VIP study was not an initiative aimed at lowering ED or UCC visits; rather, it was a study that examined the ability of a primary care delivery model to affect ED and UCC visits through better access to personalized primary care.

Results show that the presence of chronic conditions in the family was associated with statistically significantly higher ED and UCC visits and relatively large effect sizes compared to the number of visits. This is broadly consistent with previous studies that have shown patients with chronic conditions use more ED services (Giannouchos, Kum et al. 2019, Greenfield, Okoli et al. 2021). The initial purpose of the chronic condition variable in this study was for selection (Chapter 2). This is the first study to use a family level chronic condition variable to examine utilization of health care services subsequent to plan selection; other studies that defined chronic conditions as the number of conditions in the family examined plan selection but not subsequent health care utilization (Grazier, Richardson et al. 1986, Naessens, Khan et al. 2008).

Utilization may have shifted from UCCs to EDs between the pre- and post-periods. Table 4.4 shows UCC visits per unit of exposure declined from pre- to post-period for both DPC and Standard members (Standard went from 13.7 to 11.1, DPC went from 11.8 to 8.5). In contrast, ED visits increased from pre- to post- for Standard (from 13.5 to 16.1). ED visits were flat for DPC (from 12.8 to 12.9). While ED and UCC visits do not fully substitute for one other, many

non-urgent concerns could be handled equally well in either setting (Weinick, Burns et al. 2010, Ho, Metcalfe et al. 2017). The sum of ED and UCC visits for Standard members is essentially the same pre- and post-period (27.3 and 27.2); in the pre-period the total was almost split evenly into ED and UCC visits but in the post-period, nearly 60% of the total was comprised of ED visits. If Standard plan members switched to EDs for concerns that could have been handled in a lower-cost setting with the same outcome, spending may have increased unnecessarily.

This study contained a number of limitations. While it was a rigorous study of the effect of DPC on UCC and ED visits, and the first study of its kind for this model of primary care delivery, it only examined the effect of DPC for the employees and dependents of one large employer, for members participating at the time DPC was first offered. As such, one should be cautious about applying its findings to other employer groups in other parts of the country where employee behavior and underlying health care delivery factors, such as quality and availability of primary care, may vary from the group studied here.

This study examined utilization for members participating at the time DPC was first offered and the study period ended 39 months after that. Some evidence suggests that the impact of DPC on ED and UCC visits may vary over subsequent time periods. First, enrollment shifted substantially from the Standard plan to the DPC plan in the first few years. Other studies have found, similarly, that uptake of a new type of plan happens gradually over the first few years; many members are initially hesitant to switch due to switching costs, as well as cognitive misperceptions and psychological biases such as status quo bias, regret avoidance and anchoring (Samuelson 1988, Cutler, Lincoln et al. 2010). How the study period and full analysis cohort were defined may have obscured the results that will eventually emerge for this

employer group. In particular, new entrants to the plan may choose differently than existing participants since no option is in the status quo position for them (Samuelson 1988). Second, other studies show that utilization changes over the first few years after switching plans, due to the learning curve of new members and other factors (Parente, Feldman et al. 2004, Tollen, Ross et al. 2004, Tchernis, Normand et al. 2006).

Chronic condition and usual source of care variables were defined at the family level based on claims data in the pre-period. No concerns were raised about claim data accuracy or completeness with initial data validations or any data work done in this study. Different definitions or operationalization of variables, however, could have led to somewhat different or more nuanced results. Particularly with the size of the effects of the presence of chronic conditions on ED and UCC visits, it may be worthwhile to consider alternate definitions of the chronic condition variable in future research.

While the difference-in-differences method has a number of advantages, it also has important limitations. It cannot assess the availability, quality, or patient satisfaction of the primary care providers available to and utilized by Standard plan members. We can only conclude that the DPC members do not behave much differently than the Standard plan members over the study period with regard to UCC and ED visits examined separately. That is, DPC did not cause these people in this group over this time period to change their utilization much once member age and presence of chronic conditions in the family were considered.

This study cannot assess alternate explanations of its results, such as whether Standard plan members typically already had good access to their PCP and did not have much reason to use EDs or UCCs, which could mean switching to DPC made little difference on the number of

visits. This study did not determine the extent to which members may have substituted ED visits for UCC visits, particularly Standard plan members in the post-period, although results suggest this may be an interesting area for further inquiry. Other recommendations for further research include continuing this analysis for subsequent time periods and conducting similar studies on different employer groups in other parts of the country. In addition, studies that examine both family level chronic condition variables as related to plan selection, and member level chronic condition variables as related to health care utilization may be valuable.

4.5 Conclusions

Given concerns about high health care expenditures and inappropriate use of emergency rooms for non-urgent and low acuity needs, given that medical benefits are the most important employer benefit for recruiting and retaining employees and are the second largest expense after payroll for many businesses (Chamberlain 2016), and given access and other long-standing challenges faced by primary care, DPC and other new models of primary care delivery should be thoroughly evaluated for their ability to reduce ED and UCC visits and thus lower health care spending in a commercially insured population. This research makes an important contribution to our understanding of the potential of DPC to reduce ED and UCC visits.

This study examined the effect of DPC on ED and UCC visits for members of a dual choice employer benefit plan. Descriptive results of unadjusted comparisons and large effect sizes of DPC on ED and UCC visits suggest that DPC may have some potential to lower health care spending in a commercially insured population by reducing unnecessary emergency department and urgent care center visits. However, effects did not achieve statistical

significance in the main analysis for ED or UCC visits. The next study examined expenditures by plan.

4.6 Works Cited

Alemayehu, B. and K. E. Warner (2004). "The lifetime distribution of health care costs." Health Serv Res **39**(3): 627-642.

Allen, L., J. R. Cummings and J. M. Hockenberry (2021). "The impact of urgent care centers on nonemergent emergency department visits." Health Serv Res **56**(4): 721-730.

Batal, H., J. Tench, S. McMillan, J. Adams and P. S. Mehler (2001). "Predicting patient visits to an urgent care clinic using calendar variables." Acad Emerg Med **8**(1): 48-53.

Berry-Millett, R., S. Bandara and T. Bodenheimer (2009). "The health care problem no one's talking about." J Fam Pract **58**(12): 633-637.

Bodenheimer, T., E. H. Wagner and K. Grumbach (2002). "Improving primary care for patients with chronic illness: the chronic care model, Part 2." JAMA **288**(15): 1909-1914.

Carlson, R. P. (2015). "Direct Primary Care Practice Model Drops Insurance and Gains Providers and Consumers." Physician Leadersh J **2**(2): 20-24, 26.

Chamberlain, A., Tian, G. (2016). "Which Benefits Drive Employee Satisfaction?", from https://www.glassdoor.com/research/benefits-drive-employee-satisfaction/#_ftn1.

Chang, J. E., S. C. Brundage and D. A. Chokshi (2015). "Convenient Ambulatory Care--Promise, Pitfalls, and Policy." N Engl J Med **373**(4): 382-388.

Chase, D. (2013). On Retainer: Primary Care Practices Bypass Insurance, California HealthCare Foundation.

CHCF (2006). Overuse of Emergency Departments Among Insured Californians, California Health Care Foundation.

Cheung, P. T., J. L. Wiler and A. A. Ginde (2011). "Changes in barriers to primary care and emergency department utilization." Arch Intern Med **171**(15): 1397-1399.

Cheung, P. T., J. L. Wiler, R. A. Lowe and A. A. Ginde (2012). "National study of barriers to timely primary care and emergency department utilization among Medicaid beneficiaries." Ann Emerg Med **60**(1): 4-10 e12.

Cole, E. S. (2018). "Direct Primary Care: Applying Theory to Potential Changes in Delivery and Outcomes." J Am Board Fam Med **31**(4): 605-611.

Cutler, D., B. Lincoln and R. Zeckhauser (2010). "Selection stories: understanding movement across health plans." J Health Econ **29**(6): 821-838.

Dharshi, A. (2006). "The future of emergency care in the United States health system: a report from the Institute of Medicine." J Pediatr Surg **41**(11): 1793-1798.

Giannouchos, T. V., H. C. Kum, M. J. Foster and R. L. Ohsfeldt (2019). "Characteristics and predictors of adult frequent emergency department users in the United States: A systematic literature review." J Eval Clin Pract **25**(3): 420-433.

Grazier, K. L., W. C. Richardson, D. P. Martin and P. Diehr (1986). "Factors affecting choice of health care plans." Health Serv Res **20**(6 Pt 1): 659-682.

Greenfield, G., O. Okoli, H. Quezada-Yamamoto, M. Blair, S. Saxena, A. Majeed and B. Hayhoe (2021). "Characteristics of frequently attending children in hospital emergency departments: a systematic review." BMJ Open **11**(10): e051409.

Grembowski, D., J. Schaefer, K. E. Johnson, H. Fischer, S. L. Moore, M. Tai-Seale, R. Ricciardi, J. R. Fraser, D. Miller, L. LeRoy and A. M. R. Network (2014). "A conceptual model of the role of complexity in the care of patients with multiple chronic conditions." Med Care **52 Suppl 3**: S7-S14.

Gruneir, A., S. E. Bronskill, C. J. Maxwell, Y. Q. Bai, A. J. Kone, K. Thavorn, Y. Petrosyan, A. Calzavara and W. P. Wodchis (2016). "The association between multimorbidity and hospitalization is modified by individual demographics and physician continuity of care: a retrospective cohort study." Bmc Health Services Research **16**.

HCCI (2018). 2016 Health Care Cost and Utilization Report, Health Care Cost Institute.

HCPCSdata. "HCPCS code." Retrieved 2/28/2023, from https://www.hcpcsdata.com/Codes/S/S9088.

Hefner, J. L., R. Wexler and A. S. McAlearney (2015). "Primary care access barriers as reported by nonurgent emergency department users: implications for the US primary care infrastructure." Am J Med Qual **30**(2): 135-140.

HintHealth (2023). "Trends in Direct Primary Care 2022."

Ho, V., L. Metcalfe, C. Dark, L. Vu, E. Weber, G. Shelton and H. R. Underwood (2017). "Comparing Utilization and Costs of Care in Freestanding Emergency Departments, Hospital Emergency Departments, and Urgent Care Centers." Annals of Emergency Medicine **70**(6): 846-857.

IOM (2007). Emergency Medical Services: At the Crossroads. Washington DC, THE NATIONAL ACADEMIES PRESS.

IOM (2007). Hospital-based Emergency Care: At the Breaking Point, Institute of Medicine at the National Academies.

Ionescu-Ittu, R., J. McCusker, A. Ciampi, A. M. Vadeboncoeur, D. Roberge, D. Larouche, J. Verdon and R. Pineault (2007). "Continuity of primary care and emergency department utilization among elderly people." CMAJ **177**(11): 1362-1368.

Kenny, J. F., B. C. Chang and K. C. Hemmert (2020). "Factors Affecting Emergency Department Crowding." Emerg Med Clin North Am **38**(3): 573-587.

Lassman, D., M. Hartman, B. Washington, K. Andrews and A. Catlin (2014). "US health spending trends by age and gender: selected years 2002-10." Health Aff (Millwood) **33**(5): 815-822.

Love, R. A., J. A. Murphy, T. E. Lietz and K. S. Jordan (2012). "The effectiveness of a provider in triage in the emergency department: a quality improvement initiative to improve patient flow." Adv Emerg Nurs J **34**(1): 65-74.

Musich, S., A. Klemes, M. A. Kubica, S. Wang and K. Hawkins (2014). "Personalized preventive care reduces healthcare expenditures among Medicare Advantage beneficiaries." Am J Manag Care **20**(8): 613-620.

Musich, S., S. Wang, K. Hawkins and A. Klemes (2016). "The Impact of Personalized Preventive Care on Health Care Quality, Utilization, and Expenditures." Popul Health Manag **19**(6): 389-397.

Naessens, J. M., M. Khan, N. D. Shah, A. Wagie, R. A. Pautz and C. R. Campbell (2008). "Effect of premium, copayments, and health status on the choice of health plans." Med Care **46**(10): 1033-1040.

O'Malley, A. J., Gerland, A.M., Pham, H.H., Berenson, R.A. (2005). RISING PRESSURE: HOSPITAL EMERGENCY DEPARTMENTS AS BAROMETERS OF THE HEALTH CARE SYSTEM, Center for Studying Health System Change.

Page, L. (2013). "The rise and further rise of concierge medicine." BMJ **347**: f6465.

Parente, S. T., R. Feldman and J. B. Christianson (2004). "Evaluation of the effect of a consumer-driven health plan on medical care expenditures and utilization." Health Serv Res **39**(4 Pt 2): 1189-1210.

Pereira Gray, D. J., K. Sidaway-Lee, E. White, A. Thorne and P. H. Evans (2018). "Continuity of care with doctors-a matter of life and death? A systematic review of continuity of care and mortality." BMJ Open **8**(6): e021161.

Pines, J. M. and J. E. Hollander (2008). "Emergency department crowding is associated with poor care for patients with severe pain." Ann Emerg Med **51**(1): 1-5.

Poon, S. J., J. D. Schuur and A. Mehrotra (2018). "Trends in Visits to Acute Care Venues for Treatment of Low-Acuity Conditions in the United States From 2008 to 2015." JAMA Intern Med **178**(10): 1342-1349.

Poyorena, C., S. Patel, A. Keim, J. Monas, A. Urumov, R. Lindor, M. Girardo and D. Rappaport (2022). "Evaluating urgent care center referrals to the emergency department." J Am Coll Emerg Physicians Open **3**(6): e12838.

Raven, M. C., M. Kushel, M. J. Ko, J. Penko and A. B. Bindman (2016). "The Effectiveness of Emergency Department Visit Reduction Programs: A Systematic Review." Ann Emerg Med **68**(4): 467-483 e415.

Samuelson, W., Zeckhauser, R. (1988). "Status quo bias in decision making." Journal of Risk and Uncertainty.

Schaum, K. D. (2013). "When is a "new" patient "not new"?" Adv Skin Wound Care **26**(7): 305-306.

Starfield, B., H. Y. Chang, K. W. Lemke and J. P. Weiner (2009). "Ambulatory specialist use by nonhospitalized patients in us health plans: correlates and consequences." J Ambul Care Manage **32**(3): 216-225.

Starfield, B., L. Shi and J. Macinko (2005). "Contribution of primary care to health systems and health." Milbank Q **83**(3): 457-502.

Taylor, J. (2006). "Don't bring me your tired, your poor: the crowded state of America's emergency departments." Issue Brief George Wash Univ Natl Health Policy Forum(811): 1-24.

Tchernis, R., S. L. Normand, J. Pakes, P. Gaccione and J. P. Newhouse (2006). "Selection and plan switching behavior." Inquiry **43**(1): 10-22.

Tollen, L. A., M. N. Ross and S. Poor (2004). "Risk segmentation related to the offering of a consumer-directed health plan: a case study of Humana Inc." Health Serv Res **39**(4 Pt 2): 1167-1188.

Truven (2013). Avoidable Emergency Department Usage Analysis, Truven Health Analytics.

Trzeciak, S. and E. P. Rivers (2003). "Emergency department overcrowding in the United States: an emerging threat to patient safety and public health." Emerg Med J **20**(5): 402-405.

UCA (2019). The Essential Role of the Urgent Care Center in Population Health, Urgent Care Association.

Uscher-Pines, L., J. Pines, A. Kellermann, E. Gillen and A. Mehrotra (2013). "Emergency department visits for nonurgent conditions: systematic literature review." Am J Manag Care **19**(1): 47-59.

Wang, B., A. Mehrotra and A. B. Friedman (2021). "Urgent Care Centers Deter Some Emergency Department Visits But, On Net, Increase Spending." Health Aff (Millwood) **40**(4): 587-595.

Weinick, R. M., Betancourt, R.M. (2007). No Appoinement Needed: The Resurgence of Urgent Care Centers in the United States, California Health Care Foundation.

Weinick, R. M., S. J. Bristol and C. M. DesRoches (2009). "Urgent care centers in the U.S.: findings from a national survey." BMC Health Serv Res **9**: 79.

Weinick, R. M., R. M. Burns and A. Mehrotra (2010). "Many emergency department visits could be managed at urgent care centers and retail clinics." Health Aff (Millwood) **29**(9): 1630-1636.

Wright, B., D. Anderson, R. Whitaker, P. Shrader, J. P. Bettger, C. Wong and P. Shafer (2021). "Comparing health care use and costs among new Medicaid enrollees before and during the COVID-19 pandemic." Bmc Health Services Research **21**(1).

Yee, T., Lechner, A., Boukus, E. (2013). The Surge in Urgent Care Centers: Emergency Department Alternative or Costly Convenience?, Center for Studying Health System Change.

Yoon, J., K. M. Cordasco, A. Chow and L. V. Rubenstein (2015). "The Relationship between Same-Day Access and Continuity in Primary Care and Emergency Department Visits." PLoS One **10**(9): e0135274.

Chapter 5: Expenditures

The U.S. spends considerably more per capita on health care expenses than any other developed country (Lorenzoni, Belloni et al. 2014). For at least five decades, policy makers have been looking for the "holy grail," a reform that reduces spending while simultaneously improving quality of care, and to date no reform has achieved hoped-for reductions in health care spending (Tanenbaum 2009, Oberlander 2011, Marmor and Oberlander 2012).

One reason health care expenditures are consistently the focus of reforms is that health care consumes a large and growing portion of the economy. US health care expenditures as a portion of gross domestic product (GDP) have steadily increased in recent decades, from 5.0% of GDP in 1960 to 17.7% in 2019 (Catlin 2015, Martin, Hartman et al. 2021). In most years, health care spending growth has outpaced GDP growth. Before the impact of Covid-19, health spending growth for 2019-2028 was projected to outpace GDP growth by 1.1 percentage points per year (Keehan, Cuckler et al. 2020).

It is important to study the impact of DPC on outcomes of working age patients as improving their health may accrue benefits over many years and lowering the health care expenditures made by these patients and on their behalf by employers and Medicare could improve the financial situation of individuals, families, businesses and the Medicare program.

Health care expenditures for the subset of the US population that obtained medical coverage through an employer showed a similar pattern to the overall US population. In the decade from 2007 to 2016, health care spending among those with employer coverage grew at an annual rate of 4.4% while their total spending grew by 2.3% (Frost, Barrette et al. 2018). During that time, employers increased member out-of-pocket payments (copays, deductibles and coinsurance) to reduce the group premium increases that would have otherwise been

required (Dickman, Woolhandler et al. 2016). As a result, members with lower income or chronic conditions may have been particularly hard hit by health costs; lower income members would pay a larger share of their income in out-of-pocket costs compared to higher income members, and members with chronic conditions may use more health care than healthier members. Additionally, as wages have been slow to recover from the recession of 2007 to 2009, many members with employer coverage may have experienced higher growth in health care spending than in wages (Dickman, Woolhandler et al. 2016, Shambaugh and Strain 2021). Health care spending remains a considerable challenge for employers and their employees and dependents covered by employer sponsored medical benefits.

Direct primary care (DPC) is a primary care delivery model in which physicians are paid directly for unlimited access to a defined set of primary care services and insurance is not used for primary care. DPC physicians have much smaller patient panels than PCPs who are paid with insurance, and much more of their time is spent on patient care and other activities that benefit patients as the administrative tasks required by third-party payers are largely avoided. Total expenditures may be lower with DPC than with traditional primary care delivery for a number of reasons, including access and convenience, continuity, comprehensiveness, aligned incentives, and long-term doctor-patient relationships characterized by trust. These differences may improve health and lower expenditures over time.

Over time, the benefits of DPC may lead to more substantial expenditure reductions for chronic condition patients than for healthy patients, as CC patients have more health needs and are more poorly served by traditional insurance-based primary care compared to healthy

patients; improved primary care may make the biggest difference for the sickest patients (Bodenheimer, Wagner et al. 2002, Barker, Steventon et al. 2017).

As perhaps the single most important goal of any health care initiative or alternative payment model, it is critical to evaluate whether DPC can lower overall health care spending. This study aims to determine whether DPC can lower health care expenditures in an employer group in which employees are offered plan choice.

5.1 Literature Review

The overall premise of this research is that expenditures may be lower in DPC than in traditionally delivered primary care because the potential of better availability may lead to better clinical and interpersonal effectiveness, which leads to better patient outcomes and lower expenditures (Campbell, Roland et al. 2000). Although process variables could not be tested, this research was a valuable first step in determining whether DPC can lower overall expenditures.

Direct Primary Care (DPC) is a financing and delivery model in which patients (or employers) pay directly for care via a membership model. The median self-pay adult DPC fee was $75 per month in 2020 and the median monthly DPC fee paid by an employer for a family of four in 2021 was $158 (HintHealth 2023).. With a full panel of roughly 25% of the patients of a traditional insurance-based primary care physician (PCP), DPC physicians may have more availability than their traditional counterparts. Early results reported by DPC practices seem to indicate the model may hold promise for improving patient outcomes and lowering overall health care expenditures. Yet, most of the information on DPC results is anecdotal and superficial. Currently, there are no peer-reviewed studies published in the scholarly literature

that compare expenditures in DPC and traditional primary care delivery. It is important to conduct this research to determine whether DPC is associated with lower health care expenditures.

DPC may affect expenditures for at least two reasons. One possible effect is that DPC patients will use less health care outside of primary care because care in DPC is more accessible, convenient, continuous, and comprehensive than in traditional insurance-based primary care. Expenditures may decline to the extent that less care is received downstream of primary care, particularly expensive care such as hospital and emergency care, even if more care is received in primary care. In DPC, unlike in traditional primary care, additional visits with the physician do not increase spending as DPC fees are structured per member per month for unlimited primary care. A second possible effect is that over time, DPC patients may experience lower expenditures due to improved chronic condition management resulting from more time with their physician, higher continuity of care (Grembowski, Schaefer et al. 2014, Gruneir, Bronskill et al. 2016, Cole 2018) and improved doctor-patient relationship (Musich, Wang et al. 2016, Pereira Gray, Sidaway-Lee et al. 2018)

Higher continuity of care in DPC may be a key driver of lower expenditures. Care continuity is a concept with at least 3 dimensions: subjective experience of a caring relationship, history of interacting with the same doctor, and the doctor's access to patient data across visits (Barker, Steventon et al. 2017). Primary care continuity is often viewed as a proxy for the strength of the doctor-patient relationship (Pereira Gray, Sidaway-Lee et al. 2018). Higher continuity of primary care, i.e., higher proportion of physician contacts over time being with the most frequently seen PCP, is associated with lower utilization of some of the most

expensive health care services (ED visits and avoidable hospital admissions) (Ionescu-Ittu, McCusker et al. 2007, Bentler, Morgan et al. 2014, Barker, Steventon et al. 2017, Bazemore, Petterson et al. 2018) and lower overall expenditures (De Maeseneer, De Prins et al. 2003, Bazemore, Petterson et al. 2018).

In a direct relationship, the physician does not experience the conflict of interest of being expected to serve the interests of both the patient and the insurance company, health plan, or government program. The potential conflicts of interest inherent in third party payment schemes may lead to higher expenditures; for example, physicians paid via fee for service have a financial incentive to provide more services which increases expenditures (Berenson and Rich 2010, Rudoler, Deber et al. 2015). DPC physicians are motivated to view employers and patients as customers and they want employers and patients to be satisfied with the care they receive so they continue to be a customer or member and so they tell others of their good experiences with the DPC company, thereby helping it to grow. The financial incentives of the DPC company, the employer, and the patient are aligned.

Potential benefits of DPC are particularly salient for chronic condition (CC) patients as they are some of the sickest and most complex patients, they are often challenging to care for and poorly served by the traditional health care system. The presence of one or more CCs is associated with significantly higher utilization and expenditures, and poorer self-rated health, even after controlling for important confounding variables (Anderson 2010, Lee, Shi et al. 2014, Ge, Ong et al. 2019). Higher continuity of primary care is associated with better quality of life for patients with chronic conditions (Barker, Steventon et al. 2017).

Optimal results for CC patients require successful navigation of both medical and psychosocial challenges. The long-term nature of CCs means that the focus is on managing symptoms to achieve the best functional status, quality of life and ability to cope with their illness rather than on a cure or other shorter-term outcome. Self-management strategies are an essential component of chronic condition care and should reflect individual patient preferences and circumstances (Jordan, Briggs et al. 2008, Grembowski, Schaefer et al. 2014, Dineen-Griffin, Garcia-Cardenas et al. 2019). Higher continuity of care in DPC may be particularly beneficial for CC patients.

Traditional PCPs may not be able to spend enough time with more complex patients to understand their goals, develop appropriate treatment plans, and provide education and support for behavior change and self-management (Bodenheimer, Wagner et al. 2002, Stange and Ferrer 2009, Grembowski, Schaefer et al. 2014) and additional visits leads to additional spending. Difficulty coordinating care contributes to adverse drug interactions, unnecessary care such as duplicate labs and imaging, and poor outcomes as treatment plans and medications may not be coordinated across conditions in a way that achieves CC patient goals (IOM 2001, Priester 2005, Bower, Macdonald et al. 2011). Trust is particularly important in the context of chronic illness because of enhanced patient vulnerability, uncertainty regarding outcomes, and increased dependence on health care providers over extended periods of time (Wagner, Bennett et al. 2005, Calnan and Rowe 2006). As DPC provides personalized care in an ongoing relationship characterized by trust, plenty of time and incentives aligned with that of the employer and patient, it may hold promise for improving health and reducing expenditures of CC patients.

5.2 Data and Methodology

Data for this study came from a large employer group, a county in North Carolina, that started offering a Direct Primary Care health benefit option for the plan year that began on July 1, 2015. Nearly 1,000 employees made a medical benefit election for the 2015 plan year. Before the DPC option was added to the group's benefit offering, one plan was offered, and that plan (which will be referred to as the Standard plan) has continued to be offered unchanged. Both the DPC and the Standard options had the same benefits for non-primary care services and the employee portion of premium did not vary by plan. The DPC option and the Standard option were the same for elements related to non-primary care services and for financial elements such as premiums and out of pocket costs. DPC was provided at a site near the county's office by a DPC company that specialized in dedicated near-site and on-site clinics for large employers.

Data included enrollment and claims data from January 2014 through December 2018. DPC was first offered for the plan year that began July 1, 2015. The pre-period is January 2014 through June 2015 and the post-period is July 2015 through September 2018. Data were reported and analyzed through 2018 Q3 to allow three months for claims to be processed and reported.

Expenditures for prescription drugs were not available; the term *expenditures* excludes prescription drug expenditures. No DPC members had zero expenditures in the post-period as DPC fees were paid monthly.

Analytic method

Analyses were done at the individual person level. The main analysis used a multiple linear regression difference-in-differences approach to determine the impact DPC had on expenditures, adjusting for control variables. One advantage of a difference-in-differences approach is that unobservable differences between people who choose DPC and people who do not are essentially canceled out in the process of differencing post- and pre-periods.

As employees and covered dependents of large employers are constantly changing as people change jobs or family situations, the census of members enrolled in benefits changes monthly, with the largest change coinciding with annual benefit enrollment. A stable cohort of members was needed for the difference-in-difference analysis so that results were not skewed by members moving into and out of the plans. Members covered for a year before DPC was first offered and continuing their coverage for at least a year afterwards would comprise a stable cohort for analysis purposes; this cohort is referred to as the full analysis cohort. To take full advantage of the available claims experience, full analysis cohort members were followed past June 2016, until they left the group, switched plans, or the study period ended Sept 30, 2018. The experience of full analysis cohort members after they switched plans in the post-period was excluded because it would be inconsistent with the strength of the difference-in-differences method regarding unobservable factors.

Interpretation of analysis conducted on all members could be problematic; the impacts of members moving into and out of coverage over the study period could obscure the effects of plan choice on expenditures. In particular, members joining the group and choosing the DPC option in the post-period would be expected to look different than members continuing coverage from the pre-period into the post-period and members joining the group and the

Standard option in the post-period. Upon choosing the DPC option, the member is a new patient at the DPC practice; new patient visits look different than existing patient visits and certain types of care (e.g. specialist visits) may be more frequent as a new patient is established than is usual for a similar existing patient (Schaum 2013). The use of the full analysis cohort, a stable cohort of members who were enrolled in the medical benefit from July 2014 through June 2016, removed the problems of group instability that could have troubled the interpretation of analyses of all members. Members who were covered in the medical benefit plan prior to July 2015 and who did not continue coverage into the plan year beginning July 1, 2015 were not included in the analysis.

It was important to consider the concentration of expenditures; it is well documented that a relatively large portion of health care expenditures are concentrated among a relatively small portion of the population (Berk and Monheit 2001, Cohen 2015, Mitchell 2020). The concentration of health care spending increases the likelihood of influential outliers. Concerns about influential outliers can be mitigated by conducting sensitivity analysis after excluding the top, say, 1% or 5% of spenders (Levy and DeLeire 2008, Weichle, Hynes et al. 2013, Musich, Wang et al. 2016). Members were rank ordered by average expenditures per month over the study period to identify the top 1% of spenders.

Descriptive tables show enrollments and expenditures by quarter for all members, the full analysis cohort, and the full analysis cohort excluding top 1% spenders. Excluding top spenders mitigates concern about influential outliers (Weichle, Hynes et al. 2013). Summary tables compared expenditures per member month by plan and number of chronic conditions in the family. Two-tailed t-tests were done to determine whether expenditures members were

statistically significantly different in the pre- and post-periods. As discussed in Chapters 3 and 4, the presence of chronic conditions is a significant driver of utilization and expenditures.

Two difference-in-differences analyses were conducted; one on the full analysis cohort and one on the full analysis cohort excluding top 1% spenders. The first step of the difference-in-differences analysis was to graph expenditure trends over time for DPC and Standard plan members. If trends were parallel, multiple linear regression was used to examine the effect of plan choice on expenditures; if trends were not parallel, propensity score matching would have been performed first. The key difference-in-differences assumption is that DPC participants would experience the same trends in expenditures as Standard plan participants, after conditioning on observable characteristics. Multivariate regression was conducted with robust standard errors since plan type was determined at the family level (dependents cannot enroll in a different plan than the employee).

Dependent variable

The dependent variable was *total expenditures*, included as a continuous variable. Expenditures were operationalized as allowed amount; that is, the sum of net paid amount, coinsurance amount, copayment amount, and deductible amount for each claim. Total allowed amounts are less variable and more meaningful than charged amounts, and they are the best reflection of the overall cost of services that the patient received (Tyree, Lind et al. 2006).

Starting with July 2015, DPC expenditures include DPC fees of $125 per member per month for enrollees 18 years old and older, and $50 per member per month for children.

Independent variables

The primary independent variable was *plan type,* either DPC or Standard plan, determined monthly in the post period, as enrollees could switch between plans annually during open enrollment (July effective date) or when the family experienced a qualifying life event.

The multiple linear regression for difference-in-differences used a dichotomous time variable (pre- or post-period in reference to when DPC was first available for the July 1, 2015 effective date) and a dichotomous plan variable for DPC or Standard plan, analogous to treatment and control group, respectively.

Additional independent variables were selected based on statistically significant relationships with plan choice (as presented in the Chapter 2 and used in Chapter 3 and 4) and any additional variables available at the member level that were expected to be significantly related to expenditures. Variables included enrollee age, race, chronic conditions, usual source of care (USC), and member age. Race, number of chronic conditions and USC were defined at the family level. A family had a USC if any family member saw the same primary care provider more than once in the pre-period, as defined in Chapter 2. Race/ethnicity (black, white or other) was only available for people employed in the group in the pre-period, and chronic conditions and USC were defined at the family level based on the claims in the pre-period. Enrollee age was defined as the age of the employee on July 1, 2015, when the DPC plan option was first available, and it was categorized as younger than 45 years old, or 45 years old and older as described in Chapter 2. Member age, available for employees and dependents for the entire study period, was operationalized as year of birth (YOB) so that it had the same value throughout the study period. Member age is significantly related to health care utilization and

expenditures broadly. Older patients tend to use more health care and have higher expenditures, all else equal (Alemayehu and Warner 2004, Starfield, Chang et al. 2009, Lassman, Hartman et al. 2014).

5.3 Results

Table 5.1 represents member months (exposures) and expenditures for all members by quarter and plan. As was noted in Chapters 3 and 4 on specialist, ED and UCC visits, members enrolled in DPC increased considerably over the study period and members enrolled in the Standard plan declined somewhat. Expenditures per unit of exposure trended up over time for Standard and DPC members and Standard exhibited two unusually high quarters (2016 Q1 and Q2). Table 5.1 and Figure 5.1 represent the same members over the same time period. Standard plan expenditures per member month are considerably higher in two months (February and April 2016) than all other months. Aside from these outliers, expenditures per member month generally trend very similarly for Standard and DPC members, increasing slightly over the study period.

Table 5.1 Expenditures ($), All Members

	Member Months			Expenditures ($)		Expend ($) / MM	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC
2014 Q1	3,038	1,523	33.4%	1,018,685	302,003	335	198
2014 Q2	3,138	1,571	33.4%	1,373,639	673,538	438	429
2014 Q3	3,291	1,628	33.1%	1,268,561	537,796	385	330
2014 Q4	3,371	1,683	33.3%	1,126,475	405,741	334	241
2015 Q1	3,492	1,751	33.4%	1,501,309	599,342	430	342
2015 Q2	3,618	1,904	34.5%	1,542,530	567,585	426	298
2015 Q3	3,719	2,065	35.7%	1,174,242	904,303	316	438
2015 Q4	3,647	2,238	38.0%	1,843,314	1,076,999	505	481
2016 Q1	3,564	2,376	40.0%	2,611,284	975,763	733	411
2016 Q2	3,452	2,512	42.1%	3,267,903	1,330,948	947	530
2016 Q3	3,257	2,756	45.8%	1,206,213	1,080,872	370	392
2016 Q4	3,279	2,836	46.4%	1,722,321	1,164,214	525	411
2017 Q1	3,344	2,877	46.2%	1,744,954	1,604,885	522	558
2017 Q2	3,316	2,959	47.2%	2,267,766	1,727,617	684	584
2017 Q3	3,206	3,055	48.8%	1,419,125	1,338,378	443	438
2017 Q4	3,206	3,127	49.4%	2,074,547	1,663,942	647	532
2018 Q1	3,221	3,232	50.1%	1,813,027	1,855,852	563	574
2018 Q2	3,184	3,305	50.9%	1,749,441	1,802,824	549	545
2018 Q3	3,057	3,522	53.5%	1,177,210	1,836,598	385	521

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 5.1 Expenditures ($) per Member Month, All Members, Full Study Period (Jan 2014-Sept 2018)

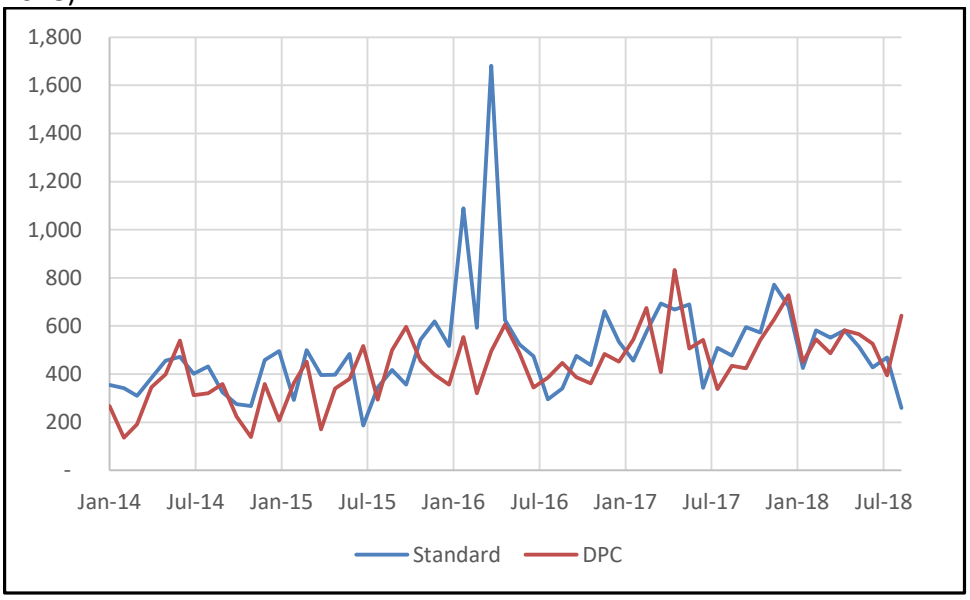


Table 5.2 represents member months (exposures) and expenditures for members of the full analysis cohort by quarter and plan. Table 5.2 and Figure 5.2 represent the same members over the same time period. The full analysis cohort was comprised of members who were continuously enrolled from July 2014 through June 2016. The enrollment pattern was similar to that in Table 5.1, although somewhat less pronounced as new members to the group in the post-period, who chose DPC over Standard plan by a wide margin, were not in the full analysis cohort. The two outliers evident in Table 5.1 and Figure 5.1 are not in the full analysis cohort. Trends of expenditures per member month are very similar for Standard and DPC members throughout the study period; trends appear to increase to mid-2017 and then decline slightly.

Table 5.2 Expenditures ($), Full Analysis Cohort

	Member Months			Expenditures ($)		Expend ($) / MM	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC
2014 Q1	2,776	1,422	33.9%	896,091	272,763	323	192
2014 Q2	2,859	1,469	33.9%	1,219,689	632,155	427	430
2014 Q3	2,955	1,518	33.9%	1,214,513	444,715	411	293
2014 Q4	2,955	1,518	33.9%	861,954	355,877	292	234
2015 Q1	2,955	1,518	33.9%	1,213,029	483,192	411	318
2015 Q2	2,955	1,518	33.9%	1,234,682	444,696	418	293
2015 Q3	2,948	1,518	34.0%	805,763	747,694	273	493
2015 Q4	2,901	1,515	34.3%	1,529,907	796,868	527	526
2016 Q1	2,815	1,504	34.8%	1,501,263	661,769	533	440
2016 Q2	2,757	1,494	35.1%	1,653,783	893,030	600	598
2016 Q3	2,550	1,467	36.5%	861,025	682,025	338	465
2016 Q4	2,471	1,432	36.7%	1,397,481	619,736	566	433
2017 Q1	2,403	1,408	36.9%	1,265,610	979,846	527	696
2017 Q2	2,321	1,371	37.1%	2,015,456	868,796	868	634
2017 Q3	2,179	1,326	37.8%	1,230,958	785,646	565	592
2017 Q4	2,130	1,306	38.0%	1,544,679	1,069,647	725	819
2018 Q1	2,079	1,288	38.3%	1,274,651	803,384	613	624
2018 Q2	2,001	1,273	38.9%	1,262,330	798,273	631	627
2018 Q3	1,895	1,262	40.0%	850,478	605,080	449	479

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 5.2 Expenditures ($) per Member Month, Full Analysis Cohort, Full Study Period (Jan 2014-Sept 2018)

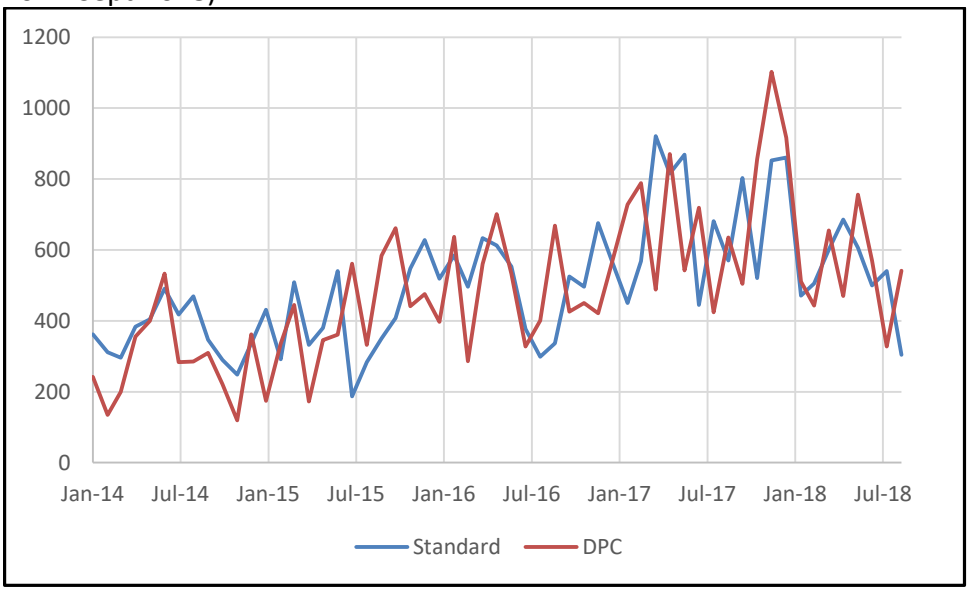


Table 5.3 and Figure 5.3 represent the full analysis cohort excluding top 1% spenders. The top 1% spenders were thirty-three members who accounted for 23.7% of total expenditures over the study period. Trends by plan over the study period are similar in Figure 5.2 and Figure 5.3. The two distinctive high values for DPC in Figure 5.3 (May 2017 and January 2018) were visible in Figure 5.2 as well. However, Figure 5.2 had corresponding peaks for Standard members so the plans tracked more closely together. Removing the top 1% spenders lowered the two peaks of Standard members but did not appear to affect the DPC peaks as much.

Table 5.3 Expenditures ($), Full Analysis Cohort excluding Top 1% Spenders

	Member Months			**Expenditures ($)**		**Expend ($) / MM**	
Quarter	Standard	DPC	% DPC	Standard	DPC	Standard	DPC
2014 Q1	2,749	1,407	33.9%	844,787	271,309	307	193
2014 Q2	2,830	1,454	33.9%	948,633	433,563	335	298
2014 Q3	2,925	1,503	33.9%	896,488	357,325	306	238
2014 Q4	2,925	1,503	33.9%	787,150	339,329	269	226
2015 Q1	2,925	1,503	33.9%	1,048,008	391,752	358	261
2015 Q2	2,925	1,503	33.9%	1,078,572	305,815	369	203
2015 Q3	2,918	1,503	34.0%	690,148	688,517	237	458
2015 Q4	2,871	1,500	34.3%	1,241,159	746,149	432	497
2016 Q1	2,785	1,489	34.8%	1,298,872	590,638	466	397
2016 Q2	2,727	1,479	35.2%	1,450,782	863,770	532	584
2016 Q3	2,523	1,452	36.5%	720,127	569,485	285	392
2016 Q4	2,447	1,417	36.7%	1,199,979	537,513	490	379
2017 Q1	2,379	1,393	36.9%	1,111,978	701,871	467	504
2017 Q2	2,297	1,359	37.2%	1,120,811	716,538	488	527
2017 Q3	2,155	1,314	37.9%	584,502	662,041	271	504
2017 Q4	2,106	1,294	38.1%	928,787	563,684	441	436
2018 Q1	2,055	1,277	38.3%	1,004,124	762,465	489	597
2018 Q2	1,977	1,264	39.0%	1,000,051	672,093	506	532
2018 Q3	1,871	1,253	40.1%	609,237	593,331	326	474

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election

Figure 5.3 Expenditures ($) per Member Month, Full Analysis Cohort excluding Top 1% Spenders, Full Study Period (Jan 2014-Sept 2018)

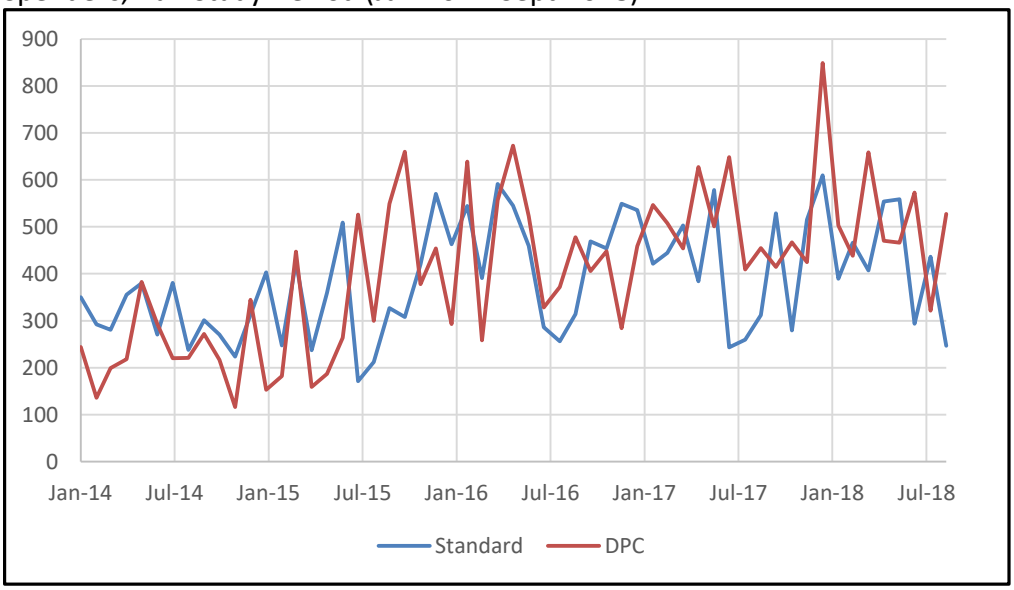


Table 5.4 presents summary statistics comparing DPC and Standard plan expenditures per member month by number of CCs in the family in the pre- and post-periods for the full analysis cohort. In the pre-period, members were characterized according to the plan they selected for the plan year beginning July 1, 2015. In the post-period, plan was determined by month. Members who lapsed coverage before July 2015 were excluded. In total and by number of CCs in the family, DPC expenditures per member month were lower than Standard in the pre-period and higher than Standard in the post-period. Differences by plan were statistically significantly different for members with no chronic conditions in the family, for both the pre-period and the post-period.

Table 5.4 Expenditures ($) per Member Month by Number of Chronic Conditions, Full Analysis Cohort

Number of Chronic Conditions in the Family	Pre-Period Jan 2014 - June 2015			Post-Period July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
0 Conditions	234	161	0.0163	348	439	0.0247
1 or More Conditions	502	483	0.7894	718	755	0.6087
Total	**380**	**294**		**547**	**568**	

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election
Prescription drug expenditures are excluded; DPC fees are included

Table 5.5 presents summary statistics comparing DPC and Standard plan expenditures per member month by number of CCs in the family in the pre- and post-periods for the full analysis cohort excluding top 1% spenders. As in Table 5.4, DPC expenditures were lower than Standard expenditures in the pre-period and higher in the post-period. In Table 5.5, statistical significance was reached in the pre-period and in the post-period for members with no CCs in the family, and in the post-period for 1 or more CCs in the family.

Table 5.5 Expenditures ($) per Member Month by Number of Chronic Conditions, Full Analysis Cohort excluding Top 1% Spenders

Number of Chronic Conditions in the Family	Pre-Period Jan 2014 - June 2015			Post-Period July 2015 - Sept 2018		
	Standard	DPC	p-value	Standard	DPC	p-value
0 Conditions	222	146	0.0077	320	394	0.0397
1 or More Conditions	411	368	0.3890	501	610	0.0321
Total	**324**	**237**		**417**	**482**	

Excludes members who lapsed coverage prior to the July 2015 benefit election
Before July 2015, members are categorized according to the July 2015 election
Prescription drug expenditures are excluded; DPC fees are included

The first step of the difference-in-differences method was to examine trends in the pre-period and determine whether they were parallel for DPC and Standard plan members of the

full analysis cohort. Figure 5.4 presents the pre-period trend of expenditures per exposure unit for the full analysis cohort members who elected DPC compared to those who elected the Standard plan. Plans exhibited very similar patterns, and slopes are parallel. No formal statistical test for parallel trends for the difference-in-differences method exists.

Figure 5.4 Expenditures ($) per Member Month, Full Analysis Cohort, Pre-Period (Jan 2014-June 2015)

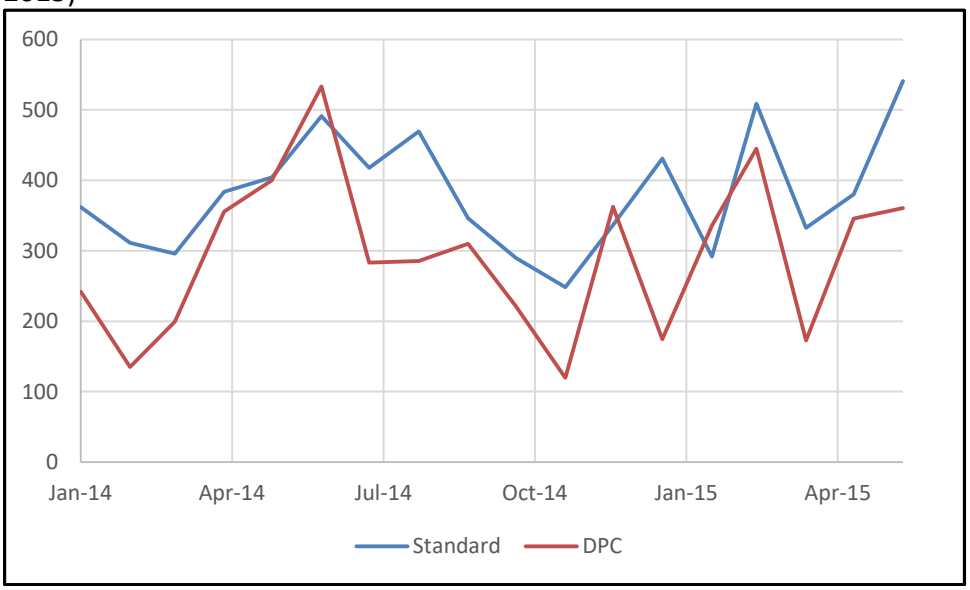
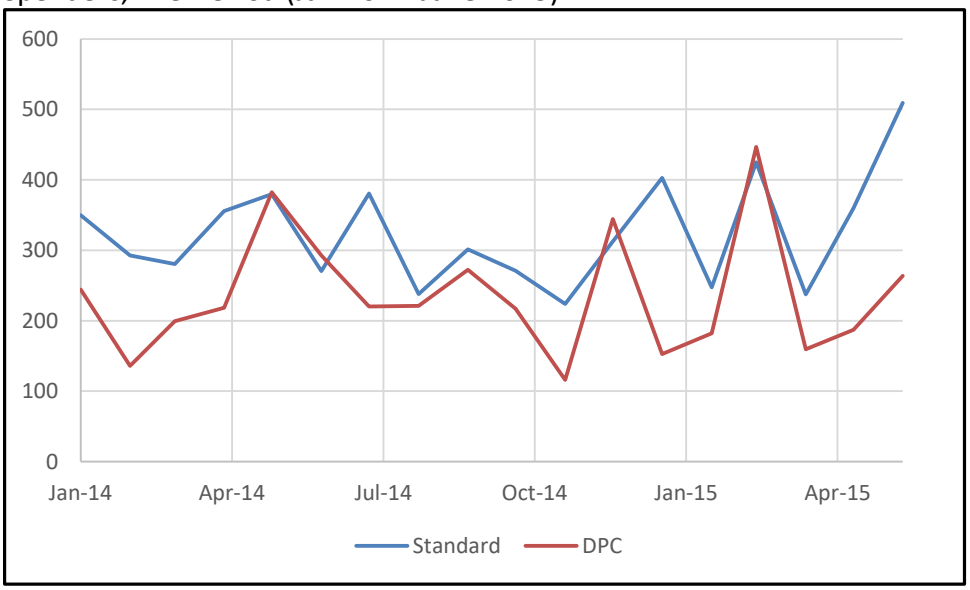


Figure 5.5 presents pre-period trends of expenditures per unit of exposure for the full analysis cohort excluding top 1% spenders. Excluding the largest claimants from the full analysis cohort compressed the trend graphs somewhat; slopes are flatter when members with the top 1% spenders were excluded compared to Figure 5.4; graphs remained parallel for purposes of difference-in-differences analysis.

Figure 5.5 Expenditures ($) per Member Month, Full Analysis Cohort excluding Top 1% Spenders, Pre-Period (Jan 2014-June 2015)



Difference-in-differences results for the full analysis cohort are shown in Tables 5.6 and 5.7. Control variables with statistically significant effect on expenditures were member age (year of birth) and number of CCs in the family. Members with one or more CCs in the family spent $245 more per member month compared to members with no CCs in the family. This effect was large compared to average expenditure levels per member month. Expenditures for Standard members increased $171 per member month from pre-to post-period ($485-$314). Expenditures for DPC members increased $277 per member month from pre-to post-period ($588-$311). The difference-in-differences result is that DPC members increased expenditures by $107 more than Standard members; this result was not statistically significant.

Table 5.6 Unadjusted Regression of Expenditures ($) per Member Month, Full Analysis Cohort

Difference in Differences Effect of DPC on Expenditures per Member Month

Time (t)	Intervention (i)	Estimate	SE	p-value
1	1	568		
1	0	547		
0	1	294		
0	0	380		
	Effect t * i	**108**	**82.4**	**0.1914**

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

Table 5.7 Regression of Expenditures ($) per Member Month, Full Analysis Cohort

	Estimate	SE	p-value
Member Year of Birth	-12	1.7	<.0001
Family Usual Source of Care (ref=none)	73	108.6	0.5037
Family Number of Chronic Conditions			
One or more (ref=none)	245	67.8	0.0003
Enrollee Race/Ethnicity			
Black (ref=white)	66	135.5	0.6268
Other (ref=white)	-77	100.8	0.4474
Enrollee Age 45+ (ref=<45)	6	70.9	0.9355

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on Expenditures per Member Month, with Control Variables

Time (t)	Intervention (i)	Estimate	SE	p-value
1	1	588		
1	0	485		
0	1	311		
0	0	314		
	Effect t * i	**107**	**82.8**	**0.1958**

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

Difference-in-differences results for the full analysis cohort excluding top 1% spenders are shown in Tables 5.8 and 5.9. Control variables with statistically significant effect on expenditures were member age (year of birth), usual source of care in the family, and number

of CCs in the family. Members with a USC in the family spent $129 more than members without, members with one or more CCs in the family spent $113 more per member month compared to members with no CCs in the family. Expenditures for Standard members increased $97 per member month from pre-to post-period ($330-$233). Expenditures for DPC members increased $248 per member month from pre-to post-period ($458-$210). The difference-in-differences result is that DPC members increased expenditures by $152 more than Standard members; this result was statistically significant. As seen in the comparisons of full analysis cohort with full analysis cohort excluding top 1% spenders in previous Tables and Figures, excluding the top spenders improved results for Standard members more than for DPC members.

Table 5.8 Unadjusted Regression of Expenditures ($) per Member Month, Full Analysis Cohort excluding Top 1% Spenders

Difference in Differences Effect of DPC on Expenditures per Member Month

Time (t)	Intervention (i)	Estimate	SE	p-value
1	1	482		
1	0	417		
0	1	237		
0	0	324		
	Effect t * i	**153**	**52.0**	**0.0033**

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

Table 5.9 Regression of Expenditures ($) per Member Month, Full Analysis Cohort excluding Top 1% Spenders

	Estimate	SE	p-value
Member Year of Birth	-10	1.0	<.0001
Family Usual Source of Care (ref=none)	129	48.7	0.0084
Family Number of Chronic Conditions			
One or more (ref=none)	113	36.4	0.0019
Enrollee Race/Ethnicity			
Black (ref=white)	10	59.2	0.8636
Other (ref=white)	-50	81.0	0.5403
Enrollee Age 45+ (ref=<45)	1	34.6	0.9873

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on Expenditures per Member Month, with Control Variables

Time (t)	Intervention (i)	Estimate	SE	p-value
1	1	458		
1	0	330		
0	1	210		
0	0	233		
	Effect t * i	**152**	**51.9**	**0.0034**

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

5.4 Discussion

Expenditures for both Standard and DPC members increased from pre- to post-period in this study. For members with no CCs in the family, DPC spending was statistically significantly lower than Standard spending in the pre-period and higher in the post-period, regardless of whether top 1% spenders were included (as shown in Tables 5.4 and 5.5). This suggests that spending may have increased significantly for DPC members with no CCs compared to similar Standard members. Perhaps the magnitude of DPC fees (which averaged $106 per DPC member per month) was largely responsible for this result, as the DPC fee was a larger share of expenditures for members with no CCs than for members with CCs. The increase in specialist

visits, detailed in Chapter 3, may also have played a role in this and other expenditure results. Additional research would be needed to test these conjectures.

Difference in differences results were statistically significant when top 1% spenders were excluded, but not when they were included. For the full analysis cohort, spending increased for DPC members by $107 more per month than it increased for Standard members. This is nearly the same as the average monthly DPC fee per member enrolled in DPC, of $106. That is, for the full analysis cohort over the time period studied, the increase in spending is nearly the amount of the DPC fee. Difference-in-differences results for the full analysis cohort excluding top 1% spenders is less favorable for DPC, in part because more of the top 1% spending occurred among Standard members.

The expenditure finding is in contrast to studies in which personalized primary care provided by MD VIP, a model similar to DPC, lowered utilization and expenditures (Klemes, Seligmann et al. 2012, Musich, Klemes et al. 2014, Musich, Wang et al. 2016). MD VIP, like DPC, has much smaller patient panels and increased access to personalized primary care than is found in traditional insurance-based primary care delivery. The finding of the current research is also in contrast to results reported by DPC companies Iora Health, Nexterra, and Qliance, which indicate lower utilization and expenditures with DPC than traditional primary care (Page 2013, Nextera 2016, NAHU 2018, Rubin 2018). However, these reports were published by the DPC companies; they were not published in peer-reviewed academic journals.

It was notable that DPC fees in this research were larger than the median monthly DPC fee of $158 paid by an employer for a family of four in 2021 (HintHealth 2023). The monthly DPC fee for a family of two adults and two children under age 18 in this research was $350 (fees

were $125 for age 18 and older, $50 for age 17 and younger). DPC fees for this employer group were more than twice the national average for a family of four. In a simple test of how much impact the magnitude of DPC fees had on difference in differences results, DPC fees were halved, which reduced the difference in differences results by $53. The effect of control variables was unchanged from analysis with actual DPC fees. Difference-in-differences results with halved DPC fees are shown in Tables 5.10 and 5.11 at the end of this Chapter.

The impact of control variables varied somewhat between the two analyses (including and excluding top spenders). When top spenders were included, the presence of CCs was statistically significant, and when top spenders were excluded, the number of CCs and USC were both statistically significant. Member age was also statistically significant in both analyses. Additionally, the effect of presence of CCs was large ($245) compared to the differences in differences result ($107) when top spenders were included. When top spenders were excluded, the total effect of USC and CCs was about the same as the effect of CCs when top spenders were included ($129 + $113 vs $245, respectively), although the total of $242 is somewhat smaller compared to the difference-in-differences result of $152. When top spenders were included, the presence of chronic conditions was by far the most impactful control variable, however, difference-in-differences results were not statistically significant when top spenders were included. In the only statistically significant result (excluding top spenders), USC and CCs were significant with effect sizes somewhat less than the size of the difference-in-differences result.

The relevance of chronic conditions for expenditures found here aligns broadly with published research. In the full analysis cohort, spending for members with CCs averaged $245

per month higher than members without. This amount dwarfs the average monthly DPC fee per member of $106 and the difference-in-differences result of DPC members spending an average of $107 more than Standard plan members per month, post- vs pre-period. The prominence of CCs as a statistically significant control variable with large effect compared to the expenditures result is consistent with spending of CC patients comprising the large majority of health care spending. Patients with one or more chronic conditions account for about 85% of health care expenditures and about 75% of private insurance spending (CDC 2017, Johnson 2018). With such a large majority of spending for patients with CCs, providing access to primary care with physicians that they trust can improve health and reduce spending, and remains a US health care system priority. Lowering the spending of CC patients over time may be one of the most important tests of the effectiveness of the DPC model overall and as an option in employer-sponsored dual choice situations.

The relevance of a usual source of care as a statistically significant control variable with large effect size compared to the expenditure result agrees with literature on the value of primary care continuity for expenditures (De Maeseneer, De Prins et al. 2003, Bazemore, Petterson et al. 2018). The USC variable in this research represents one element of care continuity, namely having a history of interacting with the same physician (Barker, Steventon et al. 2017)

This study contained a number of limitations. While it was a rigorous study of the effect of DPC on expenditures, and the first study of its kind for this newer model of primary care delivery, it only examined the effect of DPC for the employees and dependents of one large employer with a dual choice benefit offering. As such, one should be cautious about applying its

findings to other employer groups with other types of benefit offerings in other parts of the country where employee behavior and underlying health care delivery factors, such as quality and availability of primary care, may vary from the group studied here.

The lack of availability of prescription drug expenditures was an important limitation of this research. Prescription drug expenditures have been growing rapidly, even in non-elderly commercial populations (Johnson 2018, Holle, Wolff et al. 2021). The lack of prescription drug information meant some methods of categorizing the health or risk of members for purposes of selection (Chapter 2) were not available. Additionally, the contribution of prescription drugs to expenditures may have been substantial. It is possible that prescription drug utilization and spending varied by plan and would have affected findings about expenditures if prescription drug costs had been included.

This study examined expenditures for members participating at the time DPC was first offered and the study period ended 39 months after that. Some evidence suggests that the impact of DPC on utilization and expenditures may vary over subsequent time periods. First, enrollment shifted substantially from the Standard plan to the DPC plan in the first few years. Other studies have found, similarly, that uptake of a new type of plan happens gradually over the first few years; many members are initially hesitant to switch due to switching costs, as well as cognitive misperceptions and psychological biases such as status quo bias, regret avoidance and anchoring (Samuelson 1988, Cutler, Lincoln et al. 2010). How the study period and full analysis cohort were defined may have obscured the results that will eventually emerge for this employer group. In particular, new entrants to the plan may choose differently than existing participants since no option is in the status quo position for them (Samuelson 1988). Second,

other studies show that utilization changes over the first few years after switching plans, due to the learning curve of new members and other factors (Parente, Feldman et al. 2004, Tollen, Ross et al. 2004, Tchernis, Normand et al. 2006).

5.5 Conclusions

Given concerns about high health care expenditures and the growing portion of the US economy they comprise, given that medical benefits are the most important employer benefit for recruiting and retaining employees and are the second largest expense after payroll for many businesses (Chamberlain 2016), and given access and other long-standing challenges faced by primary care, DPC and other new models of primary care delivery should be thoroughly evaluated for their ability to lower health care spending in a commercially insured population. Additionally, it is important to determine whether DPC can lower spending for chronic condition patients as their spending comprises a large majority of both US health care spending and employer medical benefits spending. This research makes an important contribution to our understanding of the potential of DPC to reduce expenditures

This study examined the effect of DPC on expenditures for members of a dual choice employer benefit plan. Prescription drug costs were not included in this study; DPC fees were included. The effect was examined for members continuously enrolled from a year before and a year after DPC was first offered; the study period ended 39 months after DPC was first offered. Members who chose the DPC option were required to change primary care provider to one from the DPC company. The two plans were different only in elements related to primary care.

Compared to members who stayed in the existing medical benefit option (the Standard plan), DPC increased expenditures per member month for members who switched to the new

DPC plan, after controlling for variables associated with selection or expenditures. When all members who participated in employee benefits for a year before and after DPC was first offered were included in the analysis, the increase in spending for DPC members over the study period was a wash with the DPC fees paid. When top 1% spenders were excluded in consideration of influential outliers, spending for DPC members in excess over spending for Standard members exceeded DPC fees. The next chapter summarizes and concludes this dissertation.

Table 5.10 Regression of Expenditures ($) per Member Month, Full Analysis Cohort with Halved DPC Fees

	Estimate	SE	p-value
Member Year of Birth	-11	1.7	<.0001
Family Usual Source of Care (ref=none)	74	108.5	0.4947
Family Number of Chronic Conditions			
One or more (ref=none)	245	67.8	0.0003
Enrollee Race/Ethnicity			
Black (ref=white)	66	135.5	0.6240
Other (ref=white)	-76	100.8	0.4500
Enrollee Age 45+ (ref=<45)	4	70.9	0.9564

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on Expenditures per Member

Time (t)	Intervention (i)	Estimate	SE	p-value
1	1	535		
1	0	485		
0	1	310		
0	0	314		
	Effect t * i	**54**	**82.7**	**0.5142**

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

Table 5.11 Regression of Expenditures ($) per Member Month, Full Analysis Cohort excluding Top Spenders with Halved DPC Fees

	Estimate	SE	p-value
Member Year of Birth	-10	1.0	<.0001
Family Usual Source of Care (ref=none)	130	48.7	0.0077
Family Number of Chronic Conditions			
One or more (ref=none)	113	36.4	0.0018
Enrollee Race/Ethnicity			
Black (ref=white)	11	59.2	0.8569
Other (ref=white)	-49	81.0	0.5438
Enrollee Age 45+ (ref=<45)	-1	34.6	0.9699

Estimates are relative to the variable's reference value

Difference in Differences Effect of DPC on Expenditures per Member

Time (t)	Intervention (i)	Estimate	SE	p-value
1	1	405		
1	0	329		
0	1	210		
0	0	233		
	Effect t * i	**99**	**51.8**	**0.0564**

Time 0=pre-period, 1=post-period. Intervention 0=Standard, 1=DPC

5.6 Works Cited

Alemayehu, B. and K. E. Warner (2004). "The lifetime distribution of health care costs." Health Serv Res **39**(3): 627-642.

Anderson, G. (2010). Chronic Care: Making the Case for Ongoing Care, Agency for Healthcare Research and Quality.

Barker, I., A. Steventon and S. R. Deeny (2017). "Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data." BMJ **356**: j84.

Bazemore, A., S. Petterson, L. E. Peterson, R. Bruno, Y. Chung and R. L. Phillips, Jr. (2018). "Higher Primary Care Physician Continuity is Associated With Lower Costs and Hospitalizations." Ann Fam Med **16**(6): 492-497.

Bentler, S. E., R. O. Morgan, B. A. Virnig and F. D. Wolinsky (2014). "The association of longitudinal and interpersonal continuity of care with emergency department use, hospitalization, and mortality among Medicare beneficiaries." PLoS One **9**(12): e115088.

Berenson, R. A. and E. C. Rich (2010). "US approaches to physician payment: the deconstruction of primary care." J Gen Intern Med **25**(6): 613-618.

Berk, M. L. and A. C. Monheit (2001). "The concentration of health care expenditures, revisited." Health Aff (Millwood) **20**(2): 9-18.

Bodenheimer, T., E. H. Wagner and K. Grumbach (2002). "Improving primary care for patients with chronic illness: the chronic care model, Part 2." JAMA **288**(15): 1909-1914.

Bower, P., W. Macdonald, E. Harkness, L. Gask, T. Kendrick, J. M. Valderas, C. Dickens, T. Blakeman and B. Sibbald (2011). "Multimorbidity, service organization and clinical decision making in primary care: a qualitative study." Fam Pract **28**(5): 579-587.

Calnan, M. and R. Rowe (2006). "Researching trust relations in health care: conceptual and methodological challenges--introduction." J Health Organ Manag **20**(5): 349-358.

Campbell, S. M., M. O. Roland and S. A. Buetow (2000). "Defining quality of care." Soc Sci Med **51**(11): 1611-1625.

Catlin, A., Cowan, C. (2015). History of Health Spending in the United States, 1960-2013, Centers for Medicare and Medicaid Services.

CDC (2017). Health, United States, 2016, National Center for Health Statistics.

Chamberlain, A., Tian, G. (2016). "Which Benefits Drive Employee Satisfaction?", from https://www.glassdoor.com/research/benefits-drive-employee-satisfaction/#_ftn1.

Cohen, S. B. (2015). Differentials in the Concentration of Health Expenditures across Population Subgroups in the U.S., 2013. Statistical Brief (Medical Expenditure Panel Survey (US)). Rockville (MD).

Cole, E. S. (2018). "Direct Primary Care: Applying Theory to Potential Changes in Delivery and Outcomes." J Am Board Fam Med **31**(4): 605-611.

Cutler, D., B. Lincoln and R. Zeckhauser (2010). "Selection stories: understanding movement across health plans." J Health Econ **29**(6): 821-838.

De Maeseneer, J. M., L. De Prins, C. Gosset and J. Heyerick (2003). "Provider continuity in family medicine: does it make a difference for total health care costs?" Ann Fam Med **1**(3): 144-148.

Dickman, S. L., S. Woolhandler, J. Bor, D. McCormick, D. H. Bor and D. U. Himmelstein (2016). "Health Spending For Low-, Middle-, And High-Income Americans, 1963-2012." Health Aff (Millwood) **35**(7): 1189-1196.

Dineen-Griffin, S., V. Garcia-Cardenas, K. Williams and S. I. Benrimoj (2019). "Helping patients help themselves: A systematic review of self-management support strategies in primary health care practice." PLoS One **14**(8): e0220116.

Frost, A., E. Barrette, K. Kennedy and N. Brennan (2018). "Health Care Spending Under Employer-Sponsored Insurance: A 10-Year Retrospective." Health Aff (Millwood) **37**(10): 1623-1631.

Ge, L. X., R. Ong, C. W. Yap and B. H. Heng (2019). "Effects of chronic diseases on health-related quality of life and self-rated health among three adult age groups." Nursing & Health Sciences **21**(2): 214-222.

Grembowski, D., J. Schaefer, K. E. Johnson, H. Fischer, S. L. Moore, M. Tai-Seale, R. Ricciardi, J. R. Fraser, D. Miller, L. LeRoy and A. M. R. Network (2014). "A conceptual model of the role of complexity in the care of patients with multiple chronic conditions." Med Care **52 Suppl 3**: S7-S14.

Gruneir, A., S. E. Bronskill, C. J. Maxwell, Y. Q. Bai, A. J. Kone, K. Thavorn, Y. Petrosyan, A. Calzavara and W. P. Wodchis (2016). "The association between multimorbidity and hospitalization is modified by individual demographics and physician continuity of care: a retrospective cohort study." Bmc Health Services Research **16**.

HintHealth (2023). "Trends in Direct Primary Care 2022."
Holle, M., T. Wolff and M. Herant (2021). "Trends in the Concentration and Distribution of Health Care Expenditures in the US, 2001-2018." JAMA Netw Open **4**(9): e2125179.
IOM (2001). Crossing the Quality Chasm: A New Health System for the 21st Century, Institute of Medicine at the National Academy of Sciences.
Ionescu-Ittu, R., J. McCusker, A. Ciampi, A. M. Vadeboncoeur, D. Roberge, D. Larouche, J. Verdon and R. Pineault (2007). "Continuity of primary care and emergency department utilization among elderly people." CMAJ **177**(11): 1362-1368.
Johnson, B., Rodriquez, S. (2018). Top spenders among the commercially insured increased spending concentration and consistent turnover from 2013 to 2015, Health Care Cost Institute.
Jordan, J. E., A. M. Briggs, C. A. Brand and R. H. Osborne (2008). "Enhancing patient engagement in chronic disease self-management support initiatives in Australia: the need for an integrated approach." Med J Aust **189**(S10): S9-S13.
Keehan, S. P., G. A. Cuckler, J. A. Poisal, A. M. Sisko, S. D. Smith, A. J. Madison, K. E. Rennie, J. A. Fiore and J. C. Hardesty (2020). "National Health Expenditure Projections, 2019-28: Expected Rebound In Prices Drives Rising Spending Growth." Health Aff (Millwood) **39**(4): 704-714.
Klemes, A., R. E. Seligmann, L. Allen, M. A. Kubica, K. Warth and B. Kaminetsky (2012). "Personalized preventive care leads to significant reductions in hospital utilization." Am J Manag Care **18**(12): e453-460.
Lassman, D., M. Hartman, B. Washington, K. Andrews and A. Catlin (2014). "US health spending trends by age and gender: selected years 2002-10." Health Aff (Millwood) **33**(5): 815-822.
Lee, D. C., L. Shi, G. Pierre, J. Zhu and R. Hu (2014). "Chronic conditions and medical expenditures among non-institutionalized adults in the United States." Int J Equity Health **13**: 105.
Levy, H. and T. DeLeire (2008). "What do people buy when they don't buy health insurance and what does that say about why they are uninsured?" Inquiry **45**(4): 365-379.
Lorenzoni, L., A. Belloni and F. Sassi (2014). "Health-care expenditure and health policy in the USA versus other high-spending OECD countries." Lancet **384**(9937): 83-92.
Marmor, T. and J. Oberlander (2012). "From HMOs to ACOs: the quest for the Holy Grail in U.S. health policy." J Gen Intern Med **27**(9): 1215-1218.
Martin, A. B., M. Hartman, D. Lassman, A. Catlin and T. National Health Expenditure Accounts (2021). "National Health Care Spending In 2019: Steady Growth For The Fourth Consecutive Year." Health Aff (Millwood) **40**(1): 14-24.
Mitchell, E. M. (2020). Concentration of Healthcare Expenditures and Selected Characteristics of High Spenders, U.S. Civilian Noninstitutionalized Population, 2017. Statistical Brief (Medical Expenditure Panel Survey (US)). Rockville (MD).
Musich, S., A. Klemes, M. A. Kubica, S. Wang and K. Hawkins (2014). "Personalized preventive care reduces healthcare expenditures among Medicare Advantage beneficiaries." Am J Manag Care **20**(8): 613-620.

Musich, S., S. Wang, K. Hawkins and A. Klemes (2016). "The Impact of Personalized Preventive Care on Health Care Quality, Utilization, and Expenditures." Popul Health Manag **19**(6): 389-397.

NAHU. (2018). "Direct Primary Care Overview." from https://neahu.starchapter.com/images/meeting/051718/direct_primary_care_overview_allison_dahl.pdf.

Nextera (2016). DigitalGlobe: A Case Study, Nextera Healthcare.

Oberlander, J. (2011). "Throwing darts: Americans' elusive search for health care cost control." J Health Polit Policy Law **36**(3): 477-484.

Page, L. (2013). "The rise and further rise of concierge medicine." BMJ **347**: f6465.

Parente, S. T., R. Feldman and J. B. Christianson (2004). "Evaluation of the effect of a consumer-driven health plan on medical care expenditures and utilization." Health Serv Res **39**(4 Pt 2): 1189-1210.

Pereira Gray, D. J., K. Sidaway-Lee, E. White, A. Thorne and P. H. Evans (2018). "Continuity of care with doctors-a matter of life and death? A systematic review of continuity of care and mortality." BMJ Open **8**(6): e021161.

Priester, R., Kane, R.L., Totten, A.M. (2005). How the Current System Fails People With Chronic Illness, Society of Actuaries.

Rubin, R. (2018). "Is Direct Primary Care a Game Changer?" JAMA **319**(20): 2064-2066.

Rudoler, D., R. Deber, J. Barnsley, R. H. Glazier, A. R. Dass and A. Laporte (2015). "Paying for Primary Care: The Factors Associated with Physician Self-selection into Payment Models." Health Econ **24**(9): 1229-1242.

Samuelson, W., Zeckhauser, R. (1988). "Status quo bias in decision making." Journal of Risk and Uncertainty.

Schaum, K. D. (2013). "When is a "new" patient "not new"?" Adv Skin Wound Care **26**(7): 305-306.

Shambaugh, J. C. and M. R. Strain (2021). "The Recovery from the Great Recession: A Long, Evolving Expansion." Annals of the American Academy of Political and Social Science **695**(1): 28-48.

Stange, K. C. and R. L. Ferrer (2009). "The paradox of primary care." Ann Fam Med **7**(4): 293-299.

Starfield, B., H. Y. Chang, K. W. Lemke and J. P. Weiner (2009). "Ambulatory specialist use by nonhospitalized patients in us health plans: correlates and consequences." J Ambul Care Manage **32**(3): 216-225.

Tanenbaum, S. J. (2009). "Pay for performance in Medicare: evidentiary irony and the politics of value." J Health Polit Policy Law **34**(5): 717-746.

Tchernis, R., S. L. Normand, J. Pakes, P. Gaccione and J. P. Newhouse (2006). "Selection and plan switching behavior." Inquiry **43**(1): 10-22.

Tollen, L. A., M. N. Ross and S. Poor (2004). "Risk segmentation related to the offering of a consumer-directed health plan: a case study of Humana Inc." Health Serv Res **39**(4 Pt 2): 1167-1188.

Tyree, P. T., B. K. Lind and W. E. Lafferty (2006). "Challenges of using medical insurance claims data for utilization analysis." American Journal of Medical Quality **21**(4): 269-275.

Wagner, E. H., S. M. Bennett, B. T. Austin, S. M. Greene, J. K. Schaefer and M. Vonkorff (2005). "Finding common ground: patient-centeredness and evidence-based chronic illness care." J Altern Complement Med **11 Suppl 1**: S7-15.

Weichle, T., D. M. Hynes, R. Durazo-Arvizu, E. Tarlov and Q. Zhang (2013). "Impact of alternative approaches to assess outlying and influential observations on health care costs." Springerplus **2**: 614.

Chapter 6: Conclusions

Two of the most difficult and seemingly intractable challenges in the US health care system are high expenditures and the state of primary care delivery. Despite enormous attention on high levels of spending for at least several decades, and numerous initiatives aimed at bending the cost curve, no major reform has slowed spending across the population broadly. Despite several large well-intentioned initiatives aimed at improving the results we get from primary care, patient access to primary care continues to worsen and primary care clinicians are more frustrated and burned out every year. Primary care remains largely unable to fulfill its core tenets. As a result, health problems worsen and more care is received in the most expensive parts of the health care system, driving spending higher.

Direct Primary Care may have potential to improve the delivery of primary care in ways that affect overall spending and other important outcomes. This research examined the ability of DPC to lower specialist, emergency department, and urgent care center visits, and to lower expenditures in the first few years after a DPC option was offered to the employees and dependents of a large group. It also determined the patient and plan characteristics that were associated with plan choice when DPC was added to an existing typical medical benefit option. Selection factors must be understood to draw valid conclusions in studies of outcomes in a dual choice setting.

This research is important not only because DPC may improve two of our most difficult health care challenges, but also because of its broad applicability to how health care is delivered in the US. Health plan choice is prevalent in the US, and a large portion of the non-elderly population obtains medical coverage through an employer.

DPC is a newer model of primary care delivery and little peer-reviewed research about it has been published. This was the first research to examine patient selection of DPC in a commercial population with a dual choice medical benefit offering. It was the first to examine whether DPC lowered specialist and UCC visits in a commercial population in a dual choice setting. It was one of the first to examine ED visits and overall expenditures in a commercial population in DPC or similar models of primary care delivery.

Different types of visits were selected for this research to allow different aspects of DPC to be examined. ED and UCC visits are likely impacted primarily by 24/7 access to the DPC physician for urgent needs. In contrast, specialist visits are likely impacted by health improvement and condition stabilization over time as well as the DPC practice's operational practices and philosophy regarding new patients; patients who chose the DPC option were necessarily new patients for the DPC practice. By examining the impact of DPC on downstream utilization and expenditures, the financial benefits of DPC to patients and employers can start to be understood. Over time, the financial benefits of reduced utilization and expenditures, should they be realized, could lead to reduced premiums for coverage of downstream care, and lower overhead for the employer. This would be a welcome development as medical benefit spending and stagnant wages have been concerns of employers and employees for decades.

Chapter 2 examined selection. Older enrollees (age 45 and older) were less likely to choose DPC than younger enrollees. Families with a usual source of care were less likely to choose DPC than families with no USC. Families with chronic conditions were less likely than families without CCs to choose DPC. Black enrollees were less likely to choose DPC than white

enrollees. Enrollee age, family USC, family CCs, and enrollee race/ethnicity were included as control variables in Chapters 3 through 5, as these variables were associated with plan choice.

Chapter 3 examined specialist visits by plan. Specialist visits were statistically significantly higher for DPC than Standard members and the effect size was large compared to average number of visits per unit of exposure. CC and USC variables were statistically significant and of large effect size in the analysis of specialist visits.

It was theorized that the finding of statistically significantly higher specialist visits in DPC may reflect that all DPC members were new patients while most Standard members were established patients; however, the design of this research did not allow that theory to be tested. Additionally, the operational processes and treatment philosophy of the DPC practice were not known but likely affected the number of specialist visits of DPC members. It is possible that a DPC company or practice that serves employers may prioritize overall savings over reducing each type of utilization; with such a philosophy, specialist visits may increase as new patients are established.

Findings of ED and UCC visits in Chapter 4 were somewhat mixed; summary statistics (unadjusted for control variables) indicated that ED and UCC visits were lower for DPC than Standard members. Adjusted for controls, ED and UCC visits in the difference-in-differences analysis were lower for DPC but statistical significance was not reached. In the adjusted difference-in-differences analysis, the CC variable was statistically significant for both ED and UCC visits; it was also of large effect size compared to the average number of ED visits per exposure unit.

Chapter 5 examined spending excluding pharmaceutical costs. Expenditures per member month were higher for DPC than Standard members and statistical significance was reached in some but not all analyses. Two sets of analyses were conducted for expenditures; to mitigate the effect of influential outliers, the top 1% of spenders were excluded in the second analysis. Excluding top spenders was more impactful on Standard enrollees than DPC. Statistical significance was reached when top spenders were excluded and the effect size was large compared to average expenditures per member month. Both UCS and CC variables were statistically significant in the analysis excluding top spenders, and both had large effect sizes. When top spenders were included, the CC variable was statistically significant and of large effect size. One final note regarding expenditures was that the level of fees charged by the DPC company in this research is quite high compared to median fees nationally. In this research, DPC fees for a family of four (two adults and two minor age children) were $350; in 2021 the national median paid by an employer for a family of four was $158. Results for the impact of DPC on expenditures were likely affected by DPC fee levels in this research.

USC and CC variables were important variables throughout the dissertation. Whether a family had a usual source of care and whether chronic conditions existed in the family before being offered a DPC option in an employer-sponsored dual choice offering, were influential on plan choice and outcomes of expenditures as well as specialist, urgent care center and emergency department visits. DPC increased specialist visits and expenditures in this study. Findings indicate DPC may have the potential to reduce ED and UCC visits.

Further research is needed to evaluate the potential of DPC to deliver on the tenets of primary care and reduce health care utilization and expenditures. Research that allows for

uptake of a new type of plan to occur over multiple years after its introduction would be valuable. It is also important to study the effects of DPC over a longer period of time as some results of improved access and better health likely take time to emerge.

Appendix

Figure A.1 Flow Diagram