

ASSESSING THE IMPACT HIGH DEDUCTIBLE HEALTH PLANS HAVE ON PEOPLE WITH DIABETES

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ABSTRACT

Purpose: The primary objective is to determine the impact that High Deductible Health Plans (HDHPs) have on people with diabetes (PWD) with regards to access, cost and outcomes. The secondary objective is to analyze if social influence mechanisms are at work, do individuals within a household adjust their healthcare utilization in response to a chronic medical condition of another member of the same household? If so, how do these healthcare utilization adjustments vary when the household switches insurance plans from non-HDHP to HDHP? Based on the findings from our empirical analysis, develop a recommended course of action to resolve outstanding concerns, close any identified gaps and take advantage of existing opportunities.

Method: A four-phase project that includes a literature review, data analysis, an advisory board and a white paper.

Results: The impact of HDHPs for PWD on access, cost and outcomes are uncertain. The data are inconclusive, however, some trends do exist and are cause for concern. These trends include the disproportionate negative impact on low-income individuals, the low literacy of health insurance and the neutral to negative effects on consumer and health behavior.

Our empirical analysis does reveal statistically significant and economically relevant intra-household spillovers in healthcare utilization. Specifically, we find that subsequent members of the household delay their A1C testing upon the initial diabetes diagnosis of a fellow household member by as much as 31 percent. Relative to other households with similar demographic

characteristics and history of chronic conditions, households on HDHPs further delay the A1C testing by about 3 percent or 32 days. Subsequent members of the household delay their A1C tests even more if the initial diabetes diagnosis in the family is Type 1 diabetes rather than a Type 2 diagnosis

Conclusions: The evidence concerning high deductible health plans (HDHPs) suggests three key patterns involving people with diabetes (PWD): (1) a disproportionately negative impact on low-income individuals; (2) low healthcare literacy as a predictor of poor health outcomes; (3) the influence of insurance design on consumer and health behavior. The patterns suggest that HDHPs be customized to the diabetes disease state in order to reduce cost and improve health outcomes. Changes include policy advances, special initiatives for PWD, and leadership by employers.

INTRODUCTION

Since the introduction of HDHPs in 2004, there has been much discussion, analysis and uncertainty with regards to the impact of HDHPs on access, costs and outcomes of health care. This topic is especially relevant with regards to patients with chronic conditions, more specifically diabetes mellitus, who have more frequent health monitoring demands. Understanding the net impact of HDHPs on PWD will determine what changes and improvements to HDHPs should be implemented. .

HDHPs are defined as a plan with a deductible of at least \$1,300 for an individual or \$2,600 for a family. The intent behind HDHPs is to reduce the overall healthcare costs and utilization by incentivizing individuals to be more conscious of medical expenses, while making healthcare coverage more affordable as a result of lower insurance premiums. More specifically, the main purpose of HDHPs is to reduce healthcare utilization and drive down overall costs by minimizing use of unneeded and not needed care while at the same time making premiums more affordable.

While HDHPs can be beneficial under certain circumstances, the impact of HDHPs on PWD is uncertain. HDHPs may have negative health and financial implications for people with chronic illnesses, such as diabetes, since the out-of-pockets costs are high and continue over time. This is particularly relevant for PWD as this group of patients is growing, costs are increasing, outcomes take time and complications emerge over the long run. People with chronic conditions on HDHPs may end up deferring necessary healthcare which can result in poor outcomes and higher costs in the long run.

The short and long term impact of HDHPs on PWD is unclear. The project takes into account the following research questions: Are healthcare costs lower or do they continue to rise? Are health outcomes for PWD better or worse with HDHPs? Are there other implications and patient behaviors that we need to take into consideration?

METHODOLOGY

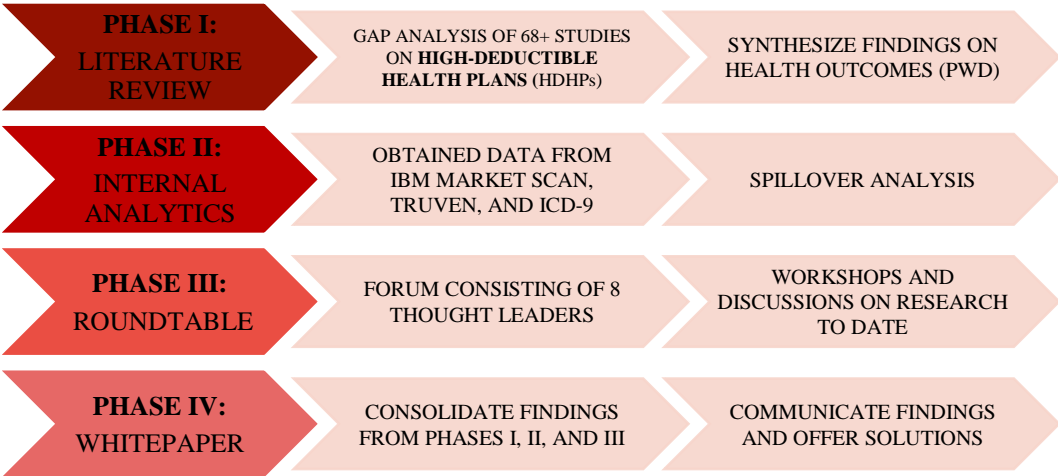
The research project comprises 4 phases.

Phase I: Literature Review - Consisted of a literature review of 68 studies from reputable medical journals and other scholarly publications. 18 of these research papers were focused specifically on HDHP and PWD.

Phase II: Data Analysis - Involved an in-depth gap analysis of Truven Health’s Marketscan Commercial Claims and Marketscan’s Benefit Plan Design (BPD) databases which together permit evaluating trends, signals, testing hypotheses, and within-household spillover analysis.

Phase III: Advisory Board - Consisted of a roundtable discussion held on February 12, 2020 with 8 leading experts in the Diabetes field representing various perspectives.

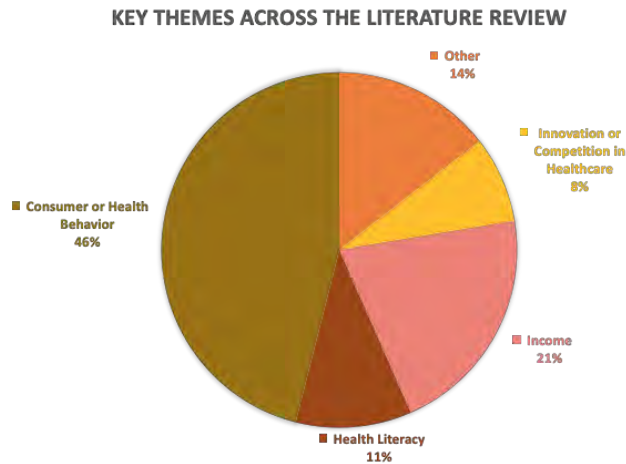
Phase IV: White Paper – A report that captures the output, conclusions and recommendations of the literature review, data analysis and advisory board. The paper synthesizes findings, consolidates conclusions and proposes next steps and areas of further exploration.



LITERATURE REVIEW KEY FINDINGS:

We reviewed a total of 68 research publications were selected based on inclusion of studies on the association of HDHPs and outcomes in PWD. 16 of the studies were selected from the honors [thesis](#) of Pooja Joshi, a UNC student who partnered with UNC Kenan-Flagler Business School's Center for the Business of Health ([CBOH](#)) in 2018 to explore trends in diabetes care and HDHPs. 10 of the publications reviewed focused on populations with diabetes, 17 of the publications mentioned diabetes specifically, and 46 of publications mentioned the broader scope of chronic and acute illnesses. Some studies did not provide conclusions that were pertinent to the objectives of this research project. Those studies were transferred to the addendum of our work. While the details from these publications provided valuable background information, they served as a complement to the more relevant data. After assessing all of the pertinent information, we narrowed our focus to 40 studies. These studies are noted in the Appendix with an asterisk.

After reviewing each of the selected publications, we organized and consolidated the key findings in a methodical manner. Among the 68 publications, there was a considerable amount of variation between study designs, outcomes measured, demographics, duration, limitations, and settings. We grouped similar projects together, but did not account for the variances between studies.



We identified the studies that were most relevant to our project and summarized the key findings and implications. The three themes that emerged from the literature review are income disparity, health insurance literacy, and consumer and health behavior.

The relationship between HDHPs and health outcomes is a complex one. While 26 studies [of the 40 main studies] found an association between HDHPs and negative health outcomes for PWD, 12 studies found no difference, and 1 study found an association between HDHPs and positive outcomes for PWD. Some variables overlapped so that HDHPs were associated with one variable (i.e. decreased healthcare utilization), but showed no statistical association with another variable (i.e. health outcomes). Limitations from each of the individual studies were noted but not analyzed in our review.

Key Themes

1. **Income disparity.** Although previous literature demonstrates that HDHPs may result in cost savings from reduced healthcare utilization, much of the research analyzed in this review suggests that lower-income individuals may be adversely affected by the HDHP

insurance design. Health care and maintenance costs for PWD are substantial, even for patients who are insured. The literature demonstrates that HDHPs do decrease utilization among PWD; however, it may result in severe medical consequences for low-income subgroups.

Compared to families enrolled in traditional plans, families whose members have chronic conditions commonly reported financial burden related to healthcare costs, especially when enrolled in HDHPs; this number doubled for low-income families in HDHPs³⁶. Although HDHPs offer lower premiums, they generally result in higher out-of-pocket expenses when a medical event occurs. For chronic diseases such as diabetes, higher numbers of medical events are nearly certain to occur, driving out-of-pocket expenses up for PWD.

Low-income PWD who are insured privately and have high deductibles are more likely to report forgoing needed medical services, such as outpatient visits or diabetes management medications^{30,37,76}. Forgoing primary or preventive medical treatment puts these patients at risk for higher severity emergency department (ED) visits and poor health outcomes in the long-term. Studies showed that after an employer-mandated switch to HDHPs, low-income patients experienced concerning increases in high-severity ED visit expenditures and hospitalization days^{89,90,92}.

2. **Health insurance literacy.** Health insurance literacy is the degree to which patients have the ability to access and understand information about health insurance plans, select the most appropriate plan for their circumstances, and utilize the plan effectively to maintain good health. While there were a limited number of studies that focused specifically on health insurance literacy, the research reflected that many patients were unsure or uninformed about their health insurance plan and its benefits.

People have a limited understanding of basic health insurance. While 8 studies validated the importance of health insurance literacy in optimal healthcare utilization, one study directly evaluated comprehension of plans and plan choice separately. This 2013 study showed that only 14% of Americans correctly identify the four basic components of health insurance plans: deductible, copays, coinsurance, and maximum out-of-pocket costs and only 11% of Americans adequately understood the cost of hospitalizations⁶³. These cross-sectional surveys provide strong evidence that consumers do not understand their current insurance plans, and suggest that plan simplification could be beneficial to the optimization of HDHPs.

While HDHPs were designed to reduce overall utilization, poor health insurance literacy limits the intended effects of deductibles and negatively impacts the health for patients with chronic illnesses. Across the 8 studies, 3 attributed unused benefits to poor health insurance literacy. A 2017 study of low-income patients with diabetes found that PWD enrolled in HDHPs might experience increased high-severity health outcomes due to

forgoing primary care that is actually covered by their plans⁷⁶. Another study found that enrollees in HDHPs are likely to reduce preventive care use, even when covered without cost sharing, and they are largely unaware of the fact that preventive care is free or low cost³². Better patient awareness is a key aspect of optimizing plan usage and improving health outcomes for PWD on HDHPs.

3. **Consumer and Health Behavior.** The majority of the research reported broadly on consumer and health behaviors—how patients prioritize or maintain their health depending on their healthcare plan. As HDHPs were designed to do, they impact the patients' consumer behavior; however, these changes in consumer behavior also translate to changes in health behavior. Our research demonstrates that these changes can have deleterious health effects on people with chronic illnesses, especially PWD.

Consumer Behavior. We defined consumer behavior as the patient's emotional, mental and behavioral responses to the design of the insurance plan and how such behaviors impacted the utilization of healthcare services. Among the studies, topics ranged from consumer elasticity in healthcare to moral hazard to attitudes about preventative care. We assessed how high deductible insurance designs impact patients' behavior in obtaining primary and preventive care for PWD. It appears that higher deductibles significantly decrease opportunities for early detection, management, and care coordination of chronic diseases⁵¹.

Two publications focused on the need for competition in healthcare to change patient behaviors, in addition to improving the quality of healthcare and decreasing overall costs to provide financial incentives to PWD to better manage their health^{57,75}. Some of the recommendations included putting patients at the center of care, creating choice, and standardizing value-based methods of payment⁵⁷. Others explored solutions related to bundled payments or value-based insurance designs. Our recommendations are explored later in this paper.

Health Behavior. Health behaviors are actions people take to maintain or enhance their health, or prevent disease. Diabetes is largely a behavioral disease, as it can be improved, managed, or prevented with good health behaviors. Good health behaviors such as a healthy diet, regular exercise, and adherence to medical regimens (i.e. monitoring insulin) are critical components of diabetes management.

We found that patients under insurance plans with less coverage show a lower likelihood of exercising regularly, modifying their diet and using oral medication³⁵. Similarly, it is generally proven that those enrolled in HDHP with chronic conditions such as Diabetes adhere 5% less to their prescribed medication than those that did not switch plans⁶¹.

The research suggests that costs associated with high deductibles provide a financial incentive for families to make certain sacrifices to their health. Delayed and forgone

care due to health care costs is higher among families with chronic conditions enrolled in HDHPs⁷⁰. Families with lower incomes are also at higher risk to delay or forgo necessary care, making them an especially vulnerable population. Considering the consumer sensitivity to costs in healthcare, we can promote positive consumer and health behaviors for PWD to provide better care and health outcomes by changing the structure of healthcare costs.

DATA ANALYSIS KEY FINDINGS:

While our review of the extant research on the impact of HDHPs on PWDs, and more broadly patients with chronic conditions, has yielded interesting findings, several related questions still remain unanswered. For example, the existing literature has generally overlooked intra-household healthcare decisions and health outcomes, and focused almost exclusively on individual-level healthcare utilization and outcomes. Therefore little, if any, is known about how HDHPs impact healthcare utilization and outcomes of family members when one or more members of the household are diagnosed with a chronic condition like diabetes.

Why should one care about intra-household healthcare decisions and behaviors? A poll conducted by Kirzinger et al. (2017), showed that about half of adults between the ages of 18-64 get their healthcare coverage through their employer, and about 34 percent of these individuals stated that they do not have enough savings to be able to pay an unexpected medical bill of \$500. Hence, higher healthcare costs induced by a chronic diagnosis of one member of the household may result in other members of the same household deferring care, which in turn could lead to negative health outcomes for them. This is partly reflected in a follow up survey conducted by Kirzinger et al. (2019). About 40 percent of the respondents in the Kirzinger et al. (2019) study said that they are living with a family member with a serious medical condition (including themselves). Forty percent of these individuals relied on home remedies or over-the-counter drugs instead of going to a doctor due to cost, or say they have postponed needed care (35 percent), and 27 percent have skipped a recommended medical test or treatment. Twenty-three percent of these respondents also say that their own or their family member's condition got worse as a result of delaying care. Kirzinger et al. (2019) found that deferring much needed care is even more pronounced amongst uninsured families with one or more serious medical conditions. Since such a large fraction of U.S. households have family members with chronic conditions, understanding whether fellow household members *actually* defer care (as opposed to stating that they defer care) due to cost considerations is both timely and pertinent to health policy administrators.

Should these intra-household trade-offs be present, how might one model intra-household healthcare decisions and behaviors? In economics, since Samuelson (1956), household decisions were represented by a single utility function wherein each family member has identical preferences. Becker (1991) was the first to point out that these unitary household-level utility functions were inconsistent with the individualist rational choice theory, especially

when individuals within the same household have differing utility functions. Becker's model assumes that family decisions are made by an altruistic dictator, i.e., the "household head," but offers little rationale for why only the household's head is altruistic, and why she/he alone is capable of making decisions in everyone's best interest^{7,74}. The unitary utility approach to studying intra-household decisions warrants ex ante information on the head of the household, or strong assumptions on why a specific individual within a family is powerful enough to make decisions in everyone's best interest. Absent such auxiliary data, one is unable to use these unitary utility models to study intra-household healthcare utilization and outcomes.

The seminal Davis (1976) study showed that in many settings the unit of decision making is neither the individual nor the monolithic household, but rather a system of decision makers who seek consensus or accommodate each other's needs while making decisions that impact the entire household¹². This led to the second approach to characterize intra-household decisions as an outcome of cooperative bargaining. In these models, family members are assumed to be in a state of both conflict and cooperation⁸⁴. Each household member has their own utility function and achieves a Pareto efficient outcome by negotiating with one another. Cooperative bargaining models reflect sociological insights about intra-household power, however, their empirical application is quite challenging in part because it requires one to explicitly model the breakdown of cooperation and identify a threat point²¹.

The third approach to study intra-household decisions uses the lens of collective models^{8,10,20}. Like cooperative bargaining models, collective models also assume that the outcome of household decisions is Pareto-efficient but do not specify any process by which this outcome is achieved. This makes it easier to apply these models to a broad range of empirical settings¹¹.

These intra-household motives would induce interdependencies in the observed healthcare utilization decisions across members within the same household. However, all of the three aforementioned structural modeling paradigms require the econometrician to specify the underlying utility function(s) at the individual/household level and be privy to the budgetary constraints that each household faces. However, due to HIPPA laws, individual- or household-level income constraints or surrogates thereof are not reported in healthcare databases. For these reasons, we are unable, at least at this juncture, to explore intra-household healthcare utilization dependencies using a structural modeling approach. This also limits our ability to structurally explore variation in intra-household healthcare utilization due to income disparity or health literacy, as is undertaken in the extant literature looking at individual healthcare utilization and outcomes.

Might there be other behavioral mechanisms that cause intra-household interdependencies in healthcare utilization and outcomes, that does not warrant a structural approach or access to household income/budget constraints? Beyond the interdependencies caused by shared budgetary constraints, prior research in sociology, economics and marketing has also shown that individual decisions could be affected by the individual's social/family environment²⁵. Such peer effects have been found in settings like unemployment, crime, pregnancy, test scores, etc.

27,16,40, 86,9,58. Cutler and Glaeser (2010) highlight that social interaction mechanisms can impact an individual's decision through three key channels, namely: (a) direct social interactions, (b) the social formation of beliefs, and (c) market-mediated spillovers.

Direct social interactions: Stem from one person's action positively (negatively) influencing a fellow family member's actions. We believe that the social interaction mechanism may be at work even in our empirical setting. For example, direct social interaction could stem from the salience of the diagnosis itself. That is, a chronic diagnosis of one family member may draw other family members' attention to the chronic condition even if the healthcare diagnosis is unlikely to offer any new information on their own health risk (ex., a genetically non-transferable chronic condition). If this mechanism is at work, *ceteris paribus*, we posit that a chronic diagnosis of one member will result in quicker and higher incidence rates of screening for the same and related chronic conditions amongst fellow family members.

Social formation of beliefs: In the context of healthcare, social formation of beliefs stems from the potential learning and revelation of new information about one's own risk from the diagnosis of a fellow family member. That is, a chronic diagnosis of one family member may draw other family members' attention to the chronic condition *and* offer new information on their own health risk (ex., a genetically transferable chronic condition). For example, adult children may be induced to learn of their genetic risk if their parent/sibling has been diagnosed with a chronic condition that is genetically transmitted (ex., Type 1 diabetes). Similarly, spouses may be exposed to information on joint risks attributed to similar lifestyles and habits (ex., Type 2 diabetes). Therefore, if the social formation of beliefs mechanism is at work, *ceteris paribus*, here, too, we posit that the chronic diagnosis of one member will result in quicker and higher incidence rates of screening for the same and related chronic conditions amongst fellow family members.

Market-mediated spillovers: The third reason for social interactions works through the market^{38,39}. Here, the marginal propensity of a family member to avail of healthcare is either positively or negatively impacted by the healthcare consumption of other family members. For example, if the healthcare utilization by other family members puts the household above its insurance deductible limit, then on the margin it reduces the cost for additional healthcare services for themselves and other family members covered by the same insurance plan. However, leading up to the deductible limit, the marginal cost for any healthcare services sought can be quite significant and therefore result in fellow family members delaying or deferring care altogether. The effect of this market-mediation mechanism will therefore be moderated by the terms of the health insurance contracts (premiums, deductible, maximum out-of-pocket, etc.).

If these social influence mechanisms are at work, do individuals within a household adjust their healthcare utilization in response to a chronic medical condition (ex., diabetes) of another member of the same household? If so, how do these healthcare utilization adjustments vary when the household switches insurance plans (ex., non-HDHP to HDHP)? Do they adjust the utilization of needed or discretionary care? Do they adjust the utilization of genetically

transferable/non-transferable chronic medical conditions? These are the research questions we attempt to address in the empirics that follow.

However, credible causal inference of intra-household spillovers in healthcare utilization is quite challenging because it is hard to credibly rule out threats to identification from common unobservables that determine the intra-household healthcare choices and outcomes⁴. So as to advance causal insights, our estimation strategy relies on the exogenous timing of healthcare shocks, i.e., time when the first diabetes diagnosis was made in the household. By focusing on the first diagnosis in the household, we can treat the diabetes diagnosis as being unpredictable and therefore as-if-random compared to a similar household(s) that may experience the same initial diabetes diagnosis at some time in the future.

Specifically, we causally quantify the time delay between the initial diabetes screening (A1C test) within a household and the diabetes screening (A1C test) by subsequent members of the same household. To ensure that the timing of the test (initial and subsequent) is not impacted by factors outside the control of the focal family member, we limit our empirical analysis only to A1C tests that were not part of an annual test/physical exam.

Database Sources: We calibrate our model by leveraging three rich databases. First, we secured the Truven Health MarketScan Commercial Claims and Encounters Database for the years 1995 through 2018. This database has been extensively used by public health researchers. The database is unique in that it is one of the few databases that affords a longitudinal view into healthcare utilization of privately insured Americans. The database covers nearly 240 million unique patients since 1995, and is a nationally representative sample of Americans with employer-provided health insurance. It captures the full continuum of care: physician office visits; hospital stays; retail, mail order, and specialty pharmacies; and carve-out care, such as mental health services. For each individual within the household (covered by the same insurance plan), the data contain rich details on each fully paid and adjudicated claim, diagnosis made and procedures undertaken during each visit, billed amount for the services rendered, amount that is the patient's responsibility, patient copayments, etc.

To study how intra-household spillovers (if any) are moderated by the type of insurance plan that covers members of the same household, we secured a second database, namely: the Truven MarketScan Benefit Plan Design (BPD) database. This database covers approximately one individual out of every four in the Truven Health MarketScan Commercial Claims and Encounters Database. It captures the benefit plans for large employers whose claims data comprise portions of the MarketScan Commercial Claims and Encounters Database. Fusing these two MarketScan databases allows us to directly observe households switching across insurance plans (if any) over time. However, one important limitation of the BPD database is that Truven's contractual arrangements with the various employers prevent it from disclosing the choice set of insurance plans facing each household whenever they elect to retain/change their employer-sponsored health insurance plan. Given our budgetary constraints, we were only able to secure the BPD database for years 2011-2016.

The third database we assembled includes details on the universe of ICD-9 CM and ICD-10 CM codes from the United States Department of Health & Human Services and the Centers for Medicare and Medicaid Services (CMS). The ICD-9 and ICD-10 codes allow us to identify observations in the Truven Health Marketscan Commercial Claims and Encounters Database that are associated with a diabetes diagnosis and/or treatment.

We used the time period from 1995 through 2018 to identify the first/initial diabetes screening/diagnosis within a household. However, to model the time from initial diabetes diagnosis in the household to time of the diabetes screening by subsequent members of the household, we focus exclusively on the time period between 2011 and 2016. This is because to answer our research questions, we also need the overlapping information on the types of insurance plans (as contained in the BPD database). Our final estimation sample comprises 1.6M households, twenty-eight percent of which were on HDHP/CDHP at some point between 2011 and 2016.

Results: We report our main estimation results in Table 1. *Ceteris paribus*, the net effect of all three social influence mechanisms is negative. That is, subsequent members of the household delay their A1C testing upon the initial diabetes diagnosis of a fellow household member. Relative to other households with similar demographic characteristics and history of chronic conditions, households on HDHPs further delay their A1C testing. To assess the economic significance of our statistical estimates, we report the marginal effects (i.e., incidence ratios) of our key covariates in Table 2. Our results show that, *ceteris paribus*, subsequent members of the household delay their time to initial screen by as much as 31 percent relative to counterfactual households that have yet to have a diabetes diagnosis in their household. Relative to “POS with Capitation,” households on HDHPs delay their time to initial screen by about 3~4%, or about 32 days. Subsequent members of the household delay their A1C tests even more if the initial diabetes diagnosis in the family is Type 1 diabetes rather than a Type 2 diagnosis.

Our analysis thus far shows credible causal evidence of intra-household spillovers in healthcare utilization, insofar as undergoing initial A1C screening for diabetes. We posit that these social spillovers in intra-household healthcare utilization and outcomes directly impact how we design policy-pertinent interventions to accelerate initial screening amongst fellow household members. However, designing and evaluating optimal interventions warrants additional analysis, including a formal investigation of how the terms of the insurance plan (as opposed to type of plan itself) impact intra-household spillovers. If after accounting for terms of the insurance contract, individuals within a household complement healthcare utilization with another individual within the same household, such indirect positive spillover effects create a social multiplier and increase the net impact of any intervention directed at a single member of the household⁴¹.

On the other hand, if individuals within a household substitute healthcare utilization with each other in the household (as we find in our current analysis), such indirect effects will create a

social divider, and decrease the net impact of an intervention directed at an individual family member. Thus any policy intervention (be it from the insurance underwriter or social planner) can have both a direct effect on the impacted individual and an indirect effect, as that person's behavior impacts everyone else in her/his family. Therefore, understanding how healthcare decisions and behaviors spillover within a family will greatly help us design and evaluate appropriate policy interventions.

Table 1

| | Days till initial diabetes screening | | |
|---------------------------------------|--------------------------------------|-------------------------|--------------------------|
| | <i>Poisson</i> | | <i>negative binomial</i> |
| | default (1) | robust (2) | NBD (3) |
| Days till first diagnosis | 0.273*** (0.011) | 0.273*** (0.037) | 0.253*** (0.032) |
| Post first diagnosis in the household | 0.0002*** (0.00001) | 0.0002*** (0.00002) | 0.0002*** (0.00003) |
| Initial Diag(Type 1) | 0.035*** (0.007) | 0.035 (0.025) | 0.144*** (0.028) |
| Initial Diag(Type 2) | 0.045*** (0.007) | 0.045* (0.025) | 0.175*** (0.032) |
| HDHP | 0.033*** (0.007) | 0.033 (0.025) | 0.128*** (0.029) |
| CHDP | -0.017*** (0.004) | -0.017*** (0.004) | 0.005 (0.020) |
| Comprehensive | -0.0002*** (0.00001) | -0.0002*** (0.00002) | -0.0001*** (0.00002) |
| θ | | | 37.674*** (0.771) |
| Akaike Inf. Crit. | 135,417.100 | 135,417.100 | 112,282.800 |

Notes:

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 2

| | Estimate | Robust SE | LL | UL |
|---------------------------------------|----------|-----------|---------|---------|
| (Intercept) | 116.260 | 1.045 | 106.611 | 126.783 |
| Post first diagnosis in the household | 1.314 | 1.038 | 1.222 | 1.414 |
| CDHP | 1.036 | 1.026 | 0.986 | 1.088 |
| Comprehensive | 1.046 | 1.026 | 0.995 | 1.100 |
| EPO | 1.040 | 1.026 | 0.988 | 1.094 |
| HDHP | 1.033 | 1.026 | 0.983 | 1.086 |
| HMO | 1.024 | 1.026 | 0.975 | 1.076 |
| POS | 1.039 | 1.026 | 0.989 | 1.092 |
| PPO | 1.036 | 1.026 | 0.986 | 1.088 |
| Initial Diag(Type 1) | 1.028 | 1.005 | 1.017 | 1.038 |
| Initial Diag(Type 2) | 0.983 | 1.004 | 0.975 | 0.992 |

ADVISORY BOARD OUTPUT AND ANALYSIS

On February 12, 2020 a virtual advisory board was held in which the research team presented the literature review key findings and the data analysis to an advisory panel of 8 leading national experts representing various fields and perspectives in the treatment and management of diabetes. The objectives of the virtual advisory board was to:

1. Present the key findings from the literature review and the data analysis,
2. Solicit feedback from the advisors,
3. Compare the findings with the advisor's real-world experience and
4. Seek expert opinions on the implications, conclusions and next steps with regards to the subject matter.

The meeting stimulated robust discussion and input. The conclusions include specific recommendations on potential modifications to the HDHP paradigm that might reduce costs while improving health outcomes for PWD.

The advisory panel consisted of the following members:

| | |
|---|---|
| John Buse, MD, PhD | Chief, Division of Endocrinology; Director, Diabetes Center; Director, NC Translational and Clinical Sciences Institute |
| Kelly Close, MBA | Founder, The DiaTribe Foundation; President, Close Concerns |
| Timothy Michael Dall, MS | Managing Director for Life Sciences Consulting, IHS Markit |
| Darren Dewalt, MD, MPH | Division Chief of General Medicine |
| Jon Easter, RPh | Director, Center for Medication Optimization; Through Practice and Policy; Professor of the Practice |
| William Polonsky, PhD, CDE | President, Behavioral Diabetes Institute |
| Rory Rickert, RPh | Principal Consultant, Integrated Healthcare Services |
| Donna Ryan, RN, RD, MPH, CDE, FADE | Ascension Health-Florida, Sacred Heart, Director Population Health |

RECOMMENDATIONS AND CONCLUSIONS:

As the result of a thorough review of the literature, analysis of the data and a robust discussion by the advisory board, the recommendations and conclusions were grouped into the following three categories: (1) Implications on policy, (2) Special initiatives for PWD, and (3) The role of employers.

POLICY IMPLICATIONS:

The advisory board discussion on policy of HDHPs for PWDs centered on preventative care, coverage and awareness of what preventative care is covered. Below is a summary of the main points that were considered.

Preventative Care: The ACA requires insurers to cover without cost-sharing screening for depression, diabetes, cholesterol, obesity, various cancers, HIV and STIs, as well as counseling for drug and tobacco use, healthy eating and other common health concerns. The costs of immunizations and reproductive health are covered at no costs as well. The Trump administration's recent [mandate](#) (Notice 2019-45) expands the list of preventative care benefits permitted to be provided by HDHPs without a deductible. See the chart below.

| Preventive care for specified conditions | For individuals diagnosed with |
|---|---|
| Angiotensin converting enzyme (ACE) inhibitors | Congestive heart failure, diabetes and/or coronary artery disease |
| Anti-resorptive therapy | Osteoporosis and/or osteopenia |
| Beta-blockers | Congestive heart failure and/or coronary artery disease |
| Blood pressure monitor | Hypertension |
| Inhaled corticosteroids | Asthma |
| Peak flow meter | |
| Insulin and other glucose-lowering agents | Diabetes |
| Retinopathy screening | |
| Glucometer | |
| Hemoglobin A1c testing | |
| International normalized ratio (INR) testing | Liver disease and/or bleeding disorders |
| Low-density lipoprotein (LDL) testing | Heart disease |
| Selective serotonin reuptake inhibitors (SSRIs) | Depression |
| Statins | Heart disease and/or diabetes |

While these two policy measures are valuable and beneficial, some concerns and challenges still remain specifically for PWD in a HDHP. Two main issues are the coverage related to PWD and the awareness of this coverage among patients and providers.

Coverage: It was noted by the advisory board that for PWD there is a much bigger burden of cost to the patient with regards to intervention, prevention and maintenance than is recognized. The above mentioned screening services and preventative care are of particular importance to PWD, however, they are not comprehensive. In addition to the ones covered in the recent policy, there are a number of specific screening and prevention services that are required for PWD; kidney disease screening for CKD, foot exams for DPNP, and neuropathy screening, to name a few. In addition, for PWD there are a number of ongoing costs associated with screening, prevention, testing, monitoring and even maintenance. These costs add up quickly and patients are constantly looking for ways to reduce the amount of out-of-pocket spend that they face on a daily basis. Furthermore, as PWD obtain treatment and medication as long as they have not met their deductible they are paying at the list price and are not benefiting from the negotiated discounts. Strong consideration should be given to covering maintenance treatment for PWD in HDHPs. At the very least, the net prices should be charged even while PWD are in the phase of paying down their deductible. This would stretch out the costs over a longer course of time.

Awareness: The larger and more urgent concern is that the prevention and screening services that *are* covered under the ACA and Notice 2019-45 for HDHPs are not clearly identified and communicated. This is a critical gap for PWDs. Many HDHP insurance plan enrollees are unaware that the ACA covers preventative care office visits, screening tests, immunizations and counseling with no out-of-pocket charges. Furthermore, even fewer are aware that the Trump mandate expands coverage for PWD in a HDHP to include insulin and other glucose lowering agents, retinopathy screening, glucometers and HbA1c testing. The vast majority of patients and even some healthcare providers are unaware what these services are and if they are free or covered for people in HDHPs. Two PSA awareness campaigns need to be developed. One targeted to patients and caregivers and another designed for providers. A solution should include a consortium of Government, Insurers and Employers to develop and implement the communication plan.

SPECIAL INITIATIVES FOR PWDs

An area of discussion during the roundtable centered on developing programs specific for PWDs in HDHPs. The group tackled the questions; can and should there be specific plans customized for PWD on HDHPs that can result in better outcomes while at the same time reducing costs? If so, what would one look like? Directed care and incentives were two topics that were discussed in detail.

Directed Care: PWD should be offered directed care that is designed to improve outcomes and have financial incentives that bring down the costs to patients. One challenge to this approach is that many patients with diabetes are likely to have comorbid conditions. This leads to the issue of prioritizing directed care and determining what are the most important healthcare elements for a patient to focus on. For PWD the focus is on checking your HbA1c, counting calories, increasing exercise and adjusting insulin and other medications just to name a few. These are daily responsibilities that consume time, energy and money. Not to mention the emotional impacts. For PWD that have comorbid conditions, all of these obligations are compounded.

A more specific proposal would be to offer financial rewards (lower premiums and/or reduction in deductibles) for PWD that follow the directed care. If you follow a customized protocol as determined by your physician, in turn you would receive discounts in your premium, deductible and/or copay. The logic is that following directed care would result in better outcomes, which would result in reduced costs. While there are some challenges with validation, the concept should be explored and tested more. Advances in technology can help in the monitoring of adherence to directed care. Employer Human Resource departments working together with Insurers, Physicians and Health benefits analysts have developed specific patient care. To date, most of these solutions don't change patient behavior, except making them consume less. Leading to the conclusion that some improvements are still needed.

Current best practices of directed care in the primary care space provide an excellent analogue that could be successfully applied to the chronic care space. In primary care, once services are authorized by a third-party/payer then the services are covered by insurance. The third-party determines where the patient will get the care and how much care to get. Applying this model to patients with chronic disease, such as diabetes, would be a way to increase the uptake of preventative care (which is already covered) and adherence to continuous treatments. For example, for routine lab tests associated with diabetes, a patient will be notified of a lab nearby that is the most cost effective. The cost is fully paid (covered) by the insurer and free to the patient. If the patient goes to a lab that is more expensive, then the insurer pays 80% of the test fees and the patient pays the difference. This insurance design would result in clear changes in behavior. This would result in lower costs, eventually lowering premiums and deductibles.

Guidance for various groups of PWD need to be provided that will inform patients of which elements to focus on and will be accompanied with a financial incentive such as a reduction in the amount of deductible. These elements need to be aligned with having the best pay-off with regards to health outcomes. If such an 'incentivized directed care' program had alignment and buy-in from the broader healthcare ecosystem, then the buy-in and commitment from patients and caregivers would be very high. Ideally a more sophisticated model would include primary and secondary prevention and screening elements as well. Including peer-support and caregivers is an important aspect that can play a key role in adherence.

An 'incentivized directed care' program should be (1) customized to PWD needs, (2) result in better outcomes, (3) incentivized by a reduction in HDHPs, and (4) incorporate comorbidities. This requires alignment with providers, payers, pharma and employers.

Incentives: Another topic of discussion centered on what incentives the payer might provide to the patient to help reduce the deductibles. For example, many policies reduce your premium and/or deductible if you can verify that you are a non-smoker. Recently, some policies tie your BMI to your rates. In the past, there were more aggressive incentives in place around lipid management, weight and disease management programs. Can and should HDHPs offer an incentive for PWD to maintain good health? For example, if a person's HbA1c is within a healthy range for a certain amount of time, then their deductible is reduced. This incentive would act as a win-win solution, as it would (a) result in better health outcomes and reduced out of pocket costs for the patient, while (b) reducing the overall and long term costs for the insurer. An example is the University of North Carolina's affiliated health plan which has a program for PWD; if they join and adhere to the program, the plan will waive copays for their diabetes medications. This would be a great demonstration of a value-based benefit design solution. One potential pitfall of these plans is that some people view the plans as discriminatory (i.e., providing a lower deductible for keeping your weight in check could be discriminatory against those who are genetically predisposed to obesity). Policies should consider putting in place incentives that offer financial rewards of either reducing the

deductible or waiving copays for PWD in HDHPs as long as they achieve certain treatment and outcome measures and comply with their directed care.

THE ROLE OF EMPLOYERS

The ACA expanding coverage to include preventive care does not necessarily mean that the health-literate will engage in preventive health behaviors, such as getting a diabetes screening. There is a need for fundamental changes to educate consumers and provide direction for their care. This could be accomplished by their employer. We cannot expect patients to be able to navigate HDHPs, co-insurance and copays all while managing their disease and treatment. Due to the chronic nature of diabetes, this support is most essential for PWD.

HDHPs have some drawbacks for patients, insurers and/or employers. As mentioned in the findings from the literature review, patients under HDHPs are financially incentivized to practice poorer health behaviors, such as forgoing necessary care to save on healthcare costs. Patients that neglect their health have increased absenteeism over the long-run, meaning lower productivity for the employer. Furthermore, HDHPs create more costs for insurers as patients with low medical adherence cause increased ED visits or hospitalizations that may have been avoided. Zero-Dollar copays and the role of Benefit Managers were two topics that garnered further discussion.

Zero-Dollar CoPay: Besides broad PSAs reminding their employees to receive preventative care, employers have the option to opt into a zero-dollar copay model for all maintenance medications. CVS Caremark materialized this idea with the Rx Zero program where diabetic patients pay \$0 out of pocket for diabetes medication. The National Business Group on Health champions this idea as it awarded Caremark as one of the best employers for healthy lifestyles. This program is limited, however, by the types of medications covered under first-dollar coverage in the current HDHP design. In order to combat this issue, the current presidential administration is working on a new law that allows insurance companies to design HDHPs that will pay for diabetes medication (insulin and other glucose-lowering agents) or medication for chronic diseases in general. Nevertheless, the patients will still pay a net price for their diabetes/ chronic condition medication under this law.

One challenge that employers face is access to employees' health records. This limits the employer's ability to create individual communications and interventions. While the CVS Caremark example is on the PBM level, employers could follow a similar plan and work around the need to provide individual solutions. A policy with a HDHPs for PWD that has a zero copay for maintenance medicine (generic orals and injectables) would be historic and completely change the paradigm regarding the ability to achieve better outcomes at lower costs.

Employer Benefit Plans: While healthcare should be directed from a patient and provider perspective in order to maximize good health outcomes, employers need to be at the center of

HDHP conversations and any policy interventions. There are a number of ways that employers can be more engaged in this endeavor, especially since employers are bearing the majority of the healthcare costs.

Employer's also have a role in providing feedback and working together with insurers to find ways to reduce the overall cost while improving outcomes. There appears to be enough evidence to warrant a review of the value of HDHPs for PWDs. For PWD adherence is a key variable in ensuring less ED visits which in turn keeps costs lower. The literature has shown that patients who do not have their diabetes under control have increased absenteeism and lower productivity. It is in both the employer and insurers best interests to have plans that focus on ensuring the best adherence possible. This would result in lower costs, better outcomes and better work performance.

Benefits Managers at employers should play a larger role in developing and providing bold plans that are designed to resolve the major challenges that PWD face. They need to be simple, easily understood and communicated, have incentives that are aligned to reduced costs and achieve better outcomes. Many employers do not have the expertise nor information to develop such bold solutions. This underscores the importance of collaborating with diabetes experts, insurers and the pharmaceutical industry to develop an aligned solution that is specific to PWD, especially those in HDHPs. As the employer pays the largest portion of the bill and has the most to gain, Benefits Managers need to take a leadership role in coordinating this initiative. Employers should be at the center of the HDHP conversation, however, in order to maximize the impact employers need to ensure that the policy solutions are informed from a patient perspective. This can be accomplished by including the voice of the employee as well as the other major players in the healthcare ecosystems such as physicians, insurers, pharmaceutical manufacturers and pharmacies. Benefit Managers need to lead an initiative to rethink HDHPs and work with patients, providers and insurers to develop a specific solution for PWD.

CONCLUSION

From the research portion of this project we organized our findings into 3 key themes: Income Disparity, Health Insurance Literacy, and Consumer and Health Behaviour. The data analysis portion of our research project showed a statistically significant and economically relevant intra-household spillover in healthcare utilization. Specifically, 31% delay in A1C testing by members of a household and those in HDHPs had a further delay of 3%, or 32 days, with even further delays if the family member has Type 1 vs Type 2 diabetes. During the advisory board portion of this project the experts took those themes and drilled down even further into the root causes and possible solutions exploring the implications on policy, special initiatives for PWD, and the role of the employer. Those discussions led us to conclude that there are some clear policy modifications that can be made to adjust to the special circumstance of PWD in

HDHPs, that PWD do require a customized solution developed with a patient centered approach and that employers have a key role in being a catalyst for such solutions.

The concluding thoughts from the experts centered on a few key initiatives. These initiatives aim to change the way that we look at care, especially for those with chronic conditions such as diabetes. For instance, the U.S. healthcare system needs to change its approach from 'sick care' to 'preventative care' so that patients stay healthier and that medical expenses are reduced. More research is needed to show that preventative care does indeed result in clear savings so that insurers and employers can fully embrace this initiative. Furthermore, directed care is a concept that needs to be adopted more across the entire healthcare ecosystem. Patients, providers, and employers should determine where money will be spent, what should be OOP vs covered for PWD and in what manner this money will be spent in order to receive the greatest value in return. Finally, informed care is a critical success factor for any patient under a HDHP but especially those with chronic conditions. Understanding what different insurance plans cover allows both patients and physicians to determine where best to spend their money. The treatment of diabetes needs to be more focused on outcomes rather than cost savings. Despite HDHPs generally leading to lower overall healthcare costs, for PWD a lot of the care is low-value, leading to higher overall healthcare costs. With better healthcare outcomes, PWD could potentially require less treatment and actually save on healthcare costs. One possible solution for PWD that benefits all key stakeholders is value-based insurance. This insurance will provide free or low-cost maintenance medications for PWD. Many suggestions from this roundtable discussion move us in that direction.

RECOMMENDATIONS

In summary, the following actions and recommendations are suggested for PWD in HDHPs.

1. **Coverage:** Policy should be adjusted to allow for maintenance medication and treatment for PWDs in HDHPs to be free or low cost. At the very least, PWD should **not** be charged at list price until the deductible is met. PWDs should benefit from the negotiated discounts that are realized after the deductible is met resulting in better outcomes.
2. **Awareness:** Two PSA awareness campaigns need to be developed. One targeted to patients and caregivers and another designed for providers. A solution should include a consortium of Government, Insurers and Employers to develop and implement the communication plan.
3. **Incentives and Directed Care:** Policies should consider putting in place incentives that offer financial rewards of either reducing the deductible or waiving copays for PWD in

HDHPs as long as they achieve certain treatment and outcome measures and comply with their directed care.

4. **Zero CoPay:** A policy with a HDHPs for PWD that has a zero copay covered by employers for maintenance medicine (generic orals and injectables) would be historic and completely change the paradigm regarding the ability to achieve better outcomes at lower costs.
5. **Employer Leadership:** Benefit Managers need to lead an initiative to rethink HDHPs and work with patients, providers and insurers to develop a specific solution for PWD.

As is the case with many improvement initiatives, these are much more effective when these approaches occur concurrently. For example, the directed care and the communications from the employer need to convey the same information and at the same time. All of the recommendations have multiplier effects. Together these recommended improvements on policy, specific initiatives for PWD and the expanded role of employers can result in increased access, reducing costs and improving outcomes for PWD in HDHPs.

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