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Consumer-Directed Health Plans and the Chronically Ill

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Abstract

Background: The appropriateness of new consumer-directed health plan (CDHP) benefit designs for people with chronic illnesses has been questioned, but little information exists regarding the experience of chronically ill individuals in CDHPs. To contribute to a better understanding of the experience of people with chronic illnesses in CDHPs, this study analyzed survey and medical claims data from a large public employer that offered a CDHP as well as other benefit options.

Methods: An analysis of a combined survey, administrative records, and medical claims data was conducted for a sample of employees participating in a large public employer's health benefits plan. The main outcome measures were plan enrollment decision, use of information, plan rating, and spending patterns.

Results: Employees with chronic illness are equally likely as other employees to join a CDHP, to understand key plan coverage features, and to report having a particularly positive or negative experience with their plan. However, CDHP enrollees with chronic illnesses assign higher ratings to their plan than do other CDHP enrollees ($p < 0.07$). They are more likely than other CDHP enrollees to use informational tools ($p < 0.05$), more likely to anticipate spending all of their savings account dollars ($p < 0.05$), and more likely actually to spend more than the deductible (particularly for prescription drug expenditures [$p < 0.05$]((**Author: ok?**))). Compared with other CDHP enrollees whose spending exceeds the deductible, enrollees with chronic illnesses spend significantly more on prescription drugs.

Conclusions: Even though the CDHP benefit design was generous, relatively few employees chose the CDHP, and the CDHP was no more attractive to employees with chronic illnesses than to other employees. Furthermore, although people with chronic illnesses who chose CDHPs had some understanding of how their HSAs would work, they tended to exhaust those accounts and also spend more than the plan's deductible. **((Author: these sentences have been added to provide concluding statements regarding some findings in this study.))**. There is much more for employers to do if they want CHDP enrollees with chronic illnesses to 'manage' their conditions more effectively.

Consumer-directed health plans (CDHPs) are now an established option in employer health benefit programs. A 2006 survey found that about 7% of employers offer CDHP and 4% of employees with a health insurance option enroll in them.[1] Employers offer two types of CDHPs.[2] One version, where the savings account is funded by the employer, is called a health reimbursement account (HRA) plan((**Author: referee A queried this stating that this might be health reimbursement arrangements, to which you answered saying the text had been revised. Please check this.**)). The employee can use the funds in the account to pay for medical expenses. When the money in the account is depleted, the employee pays all further expenses 'out of pocket' until the plan deductible is reached. After that, the insurance company covers part or all of the employee's medical care expenses. Unspent funds in the HRA 'roll over' from benefit period to benefit period but the employee typically loses accumulated balances when changing health plans or employers. The exact design features of an HRA plan are determined by the insurer and employer. In contrast, the features of a second type of CDHP, the health savings account (HSA), are set by federal statute. Both the

employer and the employee may contribute to the savings account in this plan, up to specified limits. The tax treatment for HSAs is quite favorable, with contributions treated as pre-tax income, earnings on account balances not taxed, and withdrawals exempt from taxation as long as the money is spent for medical care. In contrast to HRA balances, the employee owns the funds that accumulate in the HSA and maintains control over them when switching health plans or jobs.

CDHPs seem to appeal to a wide range of employees,[3] with some evidence that higher income employees are more likely to choose CDHPs, holding constant other personal characteristics.[4] Nevertheless, since their inception, CDHPs have been controversial. Some policy analysts have suggested that CDHPs are not equally well suited to all employees.[5] In particular, they have suggested that people with chronic illnesses will not fare well in CDHPs, noting several concerns.[6] Foremost among these is that the out-of-pocket expenditures for health care by people with chronic illnesses will be higher under CDHPs and/or that these individuals will forego beneficial care to avoid higher expenses. This concern derives in part from the large expenditures on prescription drugs incurred by people with chronic illnesses,[7] and their frequent contacts with the medical care system.

Pharmaceutical expenditures and physician visits have 'first dollar' coverage under CDHPs until savings account balances are exhausted. After that, the enrollee is in the 'donut hole' and must cover all costs out-of-pocket until the deductible is reached. These costs clearly would vary depending on the levels at which savings account balance limits and deductibles are set. Also, whether or not a chronically ill person would have higher overall expenditures in a CDHP depends on the features of plans that employers offer as alternatives to the CDHP, as well as individual sensitivity to out-of-pocket costs. Over the past few years, employers have 'thinned out' their benefit coverage in many of their health insurance options to the point that out-of-pocket costs to people with chronic illnesses may now be, in some cases, higher under the Preferred Provider Organization (PPO) benefit options available to them.[8,9] In these situations, people with chronic illnesses could be more likely to seek care under CDHP coverage than they would if enrolled in a high-deductible PPO, but presumably less likely than if they were in an Health Maintenance Organization (HMO) with small co-payments for medications and office visits.

Conceptual Model

To date, there has been little empirical evidence to address the concerns that CDHPs are not suited for chronically ill individuals. In this article, new survey and medical claims data from a large public employer that offers a CDHP as well as other benefit options are analyzed to assess the experiences of chronically ill employees in the CDHP.

The following questions were addressed using data from survey respondents enrolled in all health plans offered by the employer:

- Are employees with chronic illnesses more or less likely than other employees to choose CDHPs?
- Are employees with chronic illnesses more or less likely to understand the key features of CDHPs that could influence their expenditures and access to care?
- Are employees in a CDHP who have chronic illnesses more or less likely than others to report having a particularly positive or negative experience with their health plan?
- Do employees with chronic illnesses who are enrolled in a CDHP view their health plan more or less favorably than other employees?

There are reasons why chronically ill individuals may be more or less likely than those without chronic illness to enroll in a CDHP. Those with a chronic illness may prefer the generous benefit coverage in a CDHP and the freedom to choose providers within a relatively broad network if their spending exceeds the CDHP deductible. On the other hand, they may be less likely to choose the CDHP because they expect to incur high medical expenses and therefore they will not be able to accumulate funds in their healthcare spending accounts.

There are two key features of the CDHP benefit design that may be better understood by employees with chronic health conditions. The first feature is that the cost of prescription drugs can be paid with savings account dollars. This means that, until savings account funds are exhausted, the CDHP enrollee does not incur co-payments for prescription drugs, as is the case in tiered pharmacy benefit plans. The second feature is that preventive services are covered with no out-of-pocket expense by the CDHP; savings account dollars are not used to pay for preventive care. In this survey, all respondents were questioned regarding their understanding of these features. The hypothesis of this article is that employees who had chronic illnesses would be more likely to understand these features of the CDHP benefit design.

With respect to enrollees' experiences with their health plans, another hypothesis is that, because people with chronic illnesses have more frequent contacts with providers and plan representatives, they might be more likely to report a strong positive or negative experience. In addition, because of unfamiliarity with the CDHP benefit design and information features, CDHP enrollees with chronic illnesses might be more likely to report a negative experience than people with chronic illnesses enrolled in other plans.

Furthermore, data from only the employees who were enrolled in the CDHP were analyzed to address the following questions:

- Are CDHP enrollees with chronic illnesses more likely to access the informational tools provided by the CDHP?
- Are CDHP enrollees with chronic illnesses more likely to anticipate exhausting their HSAs?
- Do CDHP enrollees with chronic illnesses have different spending patterns than other CDHP enrollees?

A reasonable hypothesis is that people with chronic illnesses are more likely to use the tools provided by the CDHP to help manage their illnesses. They also might spend more time and effort thinking about their likely expenses in relation to the money available in their HSAs before enrolling, because they expect substantial expenses during the contract year. That being the case, they might be less likely to be 'surprised' by their spending relative to savings account balances.

There is relatively little empirical evidence on these issues. However, CDHP proponents argue that the information and decision aids available to chronically ill people in CDHPs can improve the quality of decision making regarding which treatment options to pursue, as well as the advantages and disadvantages of different prescription medications. If enrollees in CDHPs who have chronic illnesses take advantage of these tools, they may be able to manage their chronic illnesses more effectively, both from a cost and quality-of-care standpoint. However, CDHPs may not have a particular advantage over other benefit designs in supporting their members through information and decision-making aids. CDHPs are only one benefit design in the multiple product lines of large insurers, and these insurers are likely to make their decision support tools available to enrollees in all of their products, not just to CDHP enrollees.[2] This seems especially likely for enrollees in high-deductible PPOs who can choose among a wide range of care providers and are likely to incur substantial out-of-pocket costs. Again, empirical evidence is lacking.

In section 2, the data and methods used to answer these questions are described, in section 3, the results are outlined, and in section 4, the implications of our findings for disease management in a CDHP setting are discussed.

Methods((Author: subheadings have been added in this section. Please confirm they are ok))

Descriptions of Different Health Plans

To address the research questions, data were used from the experiences of employees enrolled in health benefit options offered by the University of Minnesota (Minneapolis, MN, USA), which has over 14 000 employees participating in its health benefit plan((**Author: please confirm that rewording is ok**)). Table I presents the number of individuals enrolled in each of the available

Table I. 2003 University of Minnesota health benefit options and enrollment

Type of Health Plan	Total cost ($US)	Less UM contribution ($US)	Employee contribution ($US)	Number of individuals enrolled (n = 14 129)
Employee-only coverage				**7340**
HealthPartners Classic	131.00	131.00	0.00	5069
Patient Choice Cost Group I	131.80	131.00	0.80	326
Patient Choice Cost Group II	140.50	131.00	9.50	533
Patient Choice Cost Group III	150.70	131.00	19.70	564
PreferredOne National	179.40	131.00	48.40	375
Definity Health Option 1[a]	141.20	131.00	10.20	291
Definity Health Option 2[a]	131.00	131.00	0.00	182
Family coverage				**6789**
HealthPartners Classic	327.50	307.80	19.70	4179
Patient Choice Cost Group I	329.60	307.80	21.80	354
Patient Choice Cost Group II	351.30	307.80	43.50	718
Patient Choice Cost Group III	376.80	307.80	69.00	747
PreferredOne National	448.40	307.80	140.60	335
Definity Health Option 1[a]	353.00	307.80	45.20	318
Definity Health Option 2[a]	327.50	307.80	19.70	138

a Denotes Consumer-Directed Health Plans

UM = utilization management **((Author: ok?)).**

health benefit options, and premiums for each of the plans available to University of Minnesota employees for the calendar year 2003. A brief description of these choices are described in the following paragraphs.**((Author: please confirm that the addition of this sentence is ok))**

In 2002, the University of Minnesota, began to offer two CDHP options from Definity Health (a healthcare insurer offering CDHPs based in Minneapolis, MN, USA**((Author: ok?))**). Both CDHP options were HRA plans, with employer-funded accounts in 2003 of $US750 for employees and $US1500 for families. In option 1, the deductible was $US1500 per employee and $US3000 per family. In the less expensive option 2, it was $US2250 per employee and $US4500 per family, creating a larger 'donut hole' or area of no coverage for employees.

HealthPartners, an HMO that featured a physician network consisting of owned and contracted group practices, had a long history of being offered to University of Minnesota employees. It had the most comprehensive benefit coverage of the available choices, and required the smallest employee contribution toward premiums.**((Author: please confirm that rewording is ok))**

Patient Choice was a tiered, direct-contracting product patterned after the Buyers Health Care Action Group's health benefit design in the Twin Cities (Minneapolis and Saint Paul, MN, USA**((Author: ok?))**); for a description of this product and its history, see Christianson et al.[10] and Christianson and Feldman.[11] It required a co-payments of $US200 per hospital admission and had a larger co-payments for office visits than did HealthPartners**((Author: are these figures 2003 values?))**.

Preferred One, a PPO, featured a $US200 per admission co-payment for inpatient care and relatively high co-payments for visits**((Author: please provide the year of costs?))**.

Out-of-pocket maximum expenses were higher for the CDHP options, relative to the other plans, where there was a cap of $US2500 per person and $US4000 per family. In the CDHP option, the out-of-pocket maximums were set at $US2500 per person and $US5000 per family. In option 2, they were $US3000 per person and $US6000 per family. Prescription drug coverage for the non-CDHP options was identical, with a three-tier design and an out-of-pocket maximum for prescription drugs of $US500 per person and $US1000 per family. The required employee premium contributions for the CDHP plans were competitive; along with HealthPartners, CDHP option 2 had the lowest employee contribution. Preferred One required the largest contribution towards premiums. **((Author: please provide year of costings for all the monetary figures in this paragraph.))**

Survey of Research Questions

The attributes of the CDHP benefit design compared with PPO and HMO health plan options are presented in table II. Human resources databases from the University of Minnesota provided some limited information regarding the characteristics of these individuals. A random sample of employees were surveyed by telephone, over-sampling members in the CDHP to address our research questions**((Author: please provide total number of patients (and number in CDHP and other options) who were**

Table II. Comparison of design features for consumer-directed health plans (CDHP) and other plans offered by the University of Minnesota in 2003

Plan characteristic	CDHP	HMO and PPOs
Employer HRA contribution	$US750 single option $US1500 family option	Not applicable
Deductible	$US1550 single option 1 $US3000 family option 1 $US2250 single option 2 $US4500 family option 2	None
Co-insurance/co-payment	None	$US10–20 office visit co-payment $US200 inpatient co-payment (PPO) $US0 inpatient co-payment (HMO)
Prescription coverage	Same as other covered services	$US10 generic $US20 formulary brand $US30 non-formulary brand
Preventive care	100% covered	100% covered
Stop-loss limit	$US2500 single option 1 $US5000 family option 1 $US3000 single option 2 $US6000 family option 2	$US2500 person $US5000 family

HMO = Health maintenance organization; **HRA** = health reimbursement account; **PPO** = preferred provider organization.

Table III. Demographic characteristics of survey respondents with a chronic illness and those with no chronic illness

Variable (mean values)	Chronic illness			No chronic illness (n = 659)
	all enrollees (n = 362) **((Author: ok))**	CDHP enrollees (n = 195) **((Author: ok))**	enrollees in other plans (n = 167) **((Author: ok?))**	**((Author: ok?))**
Age (y)	50.96[a]	52.81[b]	48.8	45.34
Gender (female = 1, male = 0)	0.52	0.42[b]	0.65	0.56
Salary ($US in 1000s)	61.76[a]	74.38[b]	47.02	52.03
Type of contract (family = 1, else = 0)	0.56[a]	0.57[a]**((Author: ok?))**	0.54	0.44
No. of dependents	2.28[a]	2.25[b]	2.31	1.78

a Indicates significant difference at $p < 0.01$ vs enrollees with no chronic illness using a t-test statistic.

b Indicates significant difference at $p < 0.01$ vs chronic illness enrollees in other plans using a t-test statistic.

CDHP = consumer-directed health plan.

surveyed (not just responders).)). This survey, which was carried out between February and May of 2004, generated 605 responses from employees enrolled in the CDHP (a 68.3% response rate) and 501 responses from employees enrolled in other options (a 57.7% response rate).

The survey contained questions that everyone answered, regardless of their health plan option. These questions related to their experiences with doctors and nurses in the plan in 2003, overall satisfaction with the plan, use of information from the plan's website and other sources, and self-reported health status including whether they have a chronic condition such as asthma, hypertension, diabetes mellitus, or arthritis. In a previous analyses, we validated this survey-based measure with a correlation analysis using administrative claims data measures of chronic illness.[12] CDHP enrollees were asked an additional set of questions pertaining to the expected balance in their personal care account at the beginning of 2003, the actual balance at the end of the year, and use of the particular care management tools of the CDHP.

Table III contains demographic data for all survey respondents, disaggregated by whether or not the respondent reported having a chronic illness**. As expected, the demographic profile of people with chronic illnesses differed significantly on every characteristic from those without chronic illnesses. Respondents with chronic illnesses were older, more likely to be men, had higher salaries (which correlates with age), and were more likely to choose family contracts.**

Table III also displays the demographic characteristics for CDHP enrollees with chronic illnesses and other CDHP enrollees. CDHP enrollees with chronic illnesses were older, more likely to be men, have higher salaries, and more likely to have family contracts. **The difference in salaries is more pronounced than the difference observed when comparing all survey respondents with and without chronic illnesses.((Author: Some information in the previous 2 paragraphs is repeated in the results section. It is advised that the previous 2 paragraphs be removed and reworded as follows to avoid repetition: "Table III contains demographic data for all survey respondents, disaggregated by whether or not the respondent reported having a chronic illness. It also shows the demographic characteristics for CDHP enrollees with chronic illnesses and other CDHP enrollees." The bolded text, however, is not reported in the results and will need to be moved to an appropriate place in the results section.))**

Analysis of Survey Questions

A multinomial logit analysis was used for the first three research questions: to analyze the factors that influenced the employee's choice of benefit option; to determine which demographic characteristics of enrollees were related to a correct understanding of benefit coverage; and to assess the enrollee characteristics that were associated with a particularly negative or positive experience with their plan in 2003.

In the analysis of chronic illness and health plan choice, the independent variables in the estimated enrollment equation were the out-of-pocket premium contribution (tax adjusted); employee assessments of the desirability of the following: a set of descriptive health plan features (national provider network, your doctor in the network, preventive services covered, no preauthorization, small paycheck deduction, no co-payments, personal care account, online decision support tools); self-rated health status (excellent to poor); self-reported chronic illness; and a set of demographic characteristics (age, age-squared, gender, salary/wages, contract type [individual or family], number of dependents). Among the plan choices, HealthPartners was used as the contrast in the multinomial logit models.

To assess which demographic characteristics of enrollees were related to a correct understanding of benefit coverage, in addition to the independent variables already listed, an interaction term in these equations was introduced: 'having a chronic illness' was interacted with enrollment in the CDHP, to determine if people with chronic illnesses enrolled in the CDHP had a better understanding than those enrolled in other benefit designs.

Separate equations were estimated to assess the enrollee characteristics that were associated with a particularly negative or positive health plan experience. In these equations the interaction term (**'having a chronic illness' with enrollment in the CDHP") ((Author: addition of bolded term ok?)**), and a variable indicating which plan the respondent had been enrolled in during the prior year (2002) was also included. This controlled for the possibility that prior experience in the CDHP could be related to fewer 'surprises' and therefore a lower probability of reporting a particularly negative experience in 2003.

To assess the relationship between overall health plan satisfaction and chronic illness, survey respondents were asked to rate their health plans on a scale from zero to ten, with zero being the worst plan possible and ten being the best plan possible. An ordinary least squares regression analysis was used to estimate the relationship between respondent characteristics and plan rating, again controlling for the benefit option chosen in 2002.

CDHP enrollees were asked if they used any of the following Internet tools during the benefit year: provider directory, disease management/prevention information, or pharmacy pricing. A logit analysis was used to identify the enrollee characteristics that were associated with using at least one of the three Internet tools.

CDHP enrollees were asked if, at the beginning of 2003, they expected to have dollars left in their HSAs at the end of that calendar year. They were also asked if they had any funds left in the account at the end of the year. The answers to these questions provided an indicator of whether CDHP enrollees' expectations regarding savings account spending were accurate. A bivariate probit analysis was used to estimate the relationships between personal characteristics and both expectations and realizations regarding savings account dollars. A bivariate probit consists of separate equations for each dependent variable (i.e. expectations and actual balances remaining), but it allows the errors in those equations to be correlated.

To address the last research questions concerning the relationship between CDHP enrollment and medical care spending, medical claims data from 2003 for survey respondents who enrolled in the CDHP under individual or family contracts were analyzed. These claims data from 2003 were merged with the survey and the human resources data. For each contract type, three subgroups of respondents were created based on their total spending in 2003: spending that did not reach the 2002 contribution to their HSA; spending that fell into the 'donut hole;' and spending that exceeded the deductible. In each of these subgroups, spending by category – prescription drugs, physician services, and hospital care – was compared for enrollees with chronic illnesses and those with no chronic illness, using t-tests to identify significant differences in group means.

Results

The number of employees selecting the CDHP for their 2003 individual or family coverage was relatively small compared with the total number of employees in the employed group, and so, the two CDHP options (Definity options 1 and 2) were combined for all of the analyses.

Are Employees With Chronic Illnesses More or Less Likely Than Other Employees to Choose Consumer-Directed Health Plans (CDHPs)?

As stated in section 2.2, table III displays the demographic characteristics of survey respondents with chronic illnesses who were enrolled in a CDHP versus respondents with chronic illnesses who were enrolled in another benefit design. Employees with chronic illnesses who chose the CDHP were older, had higher salaries, and were more likely to be men.

According to the logit analysis, 'having a chronic illness' did not influence plan choice at the 95% confidence level. The required out-of-pocket premium was a strong predictor of choice. As in a previous analysis of plan choice,[12] higher income employees were more likely to select the CDHP. A sensitivity analyses was conducted to explore whether the lack of a significant association between 'having a chronic illness' and selection of the CDHP was due to a correlation between 'having a chronic illness' and age, income, or prior plan choice. We did not find an association between 'having a chronic illness' and plan choice under any of the model re-specifications.

Are Employees With Chronic Illnesses More or Less Likely Than Other Employees to Understand the Key Features of CDHPs That Could Influence Their Expenditures and Access to Care?

Less than half (n = 375) of the survey respondents responded correctly that prescription drugs were covered from the CDHP healthcare spending account, but more than half (n = 581) knew that preventive services were covered in the CDHP plans. As shown in table IV, there was no significant relationship between having a chronic illness and understanding either of these two features. As expected, in both cases being a CDHP enrollee was

Table IV. Logistic regression results of survey questions for enrollees with a chronic illness compared with those with no chronic illness

Variable	Number of respondents	Percentage of respondents			Odds ratio for CDHP patient effect	95% CI	Probability > 0 (χ^2)
		all (%)	chronic (%)	non-chronic (%)			
Knowledge of benefit design features	1021	37	38	36	0.99	0.46, 2.11	0.9688
Positive experience with health plan	1021	45	50	42	1.31	0.77, 2.23	0.3202
Negative experience with health plan	1021	21	23	19	0.98	0.51, 1.92	0.9619
CDHP population use of information tools	557	25	31	22	1.89	1.23, 2.91	<0.0001

CDHP = consumer-directed health plan.

associated with a correct understanding of coverage, whether or not the respondent reported having a chronic illness. Knowledge of benefit design features did not differ between CDHP enrollees with chronic illnesses and those without a chronic illness (odds ratio = 0.99; 95% CI = 0.46, 2.11; p-value = 0.97).

Are Enrollees in a CDHP Who Have Chronic Illness More or Less Likely to Report Having a Particularly Positive or Negative Experience With Their Health Plan?

All survey respondents were asked whether they had a particularly negative or a particularly positive experience with their health plan in the prior year. The proportion reporting a negative experience was 21%, while those reported a positive experience was 45%. Table IV shows that CDHP enrollees were more likely to report a negative experience, but having a chronic illness did not make one more likely than the 'average' CDHP member to report such an experience (odds ratio = 0.98; 95% CI = 0.51, 1.92; p-value = 0.96). Neither plan enrollment nor chronic illness (odds ratio = 1.31; 95% CI = 0.77, 2.23; p-value = 0.32) had an impact on the likelihood of reporting a positive experience.

Do People With Chronic Illnesses Who Are Enrolled in a CDHP Rate Their Plan More or Less Favorably Than Other Employees?

Respondents in the CDHP assigned a lower **((Author: satisfaction?))** rating to their plan than did enrollees in other options. However, enrollees in the CDHP who had chronic illnesses rated the plan more highly **((Author: in terms of?))**, by 0.43 points on a ten-point scale, than did other CDHP enrollees. This result was significant at the $p < 0.07$ level in a two-tailed t-test**((Author: generally, a p-Value of less than 0.05 is considered significant. A p-value between 0.05 and 0.1 (as reported here is not significant, but rather shows a trend toward significance. Please reword to read as follows: "This result showed a trend toward significance (p < 0.07)".))**.

Are People With Chronic Illnesses More Likely to Access the Informational Tools Provided By the CDHP?

Of the total CDHP enrollees, 140 (25%)**((Author: The last sentence in this paragraph states 141, please clarify?))** indicated that they had used at least one of the informational tools. The only significant predictor of using these tools was having a chronic illness. CDHP enrollees with chronic illnesses were more likely to use Internet information tools than other enrollees, as one might expect (odds ratio = 1.89; 95% CI = 1.23, 2.91; p-value = 0.004 [table IV**((Author: table IV shows the p-value to be <0.0001? Please amend text or table for consistency)))**. Of the 141 **((Author: 140?))**CDHP enrollees who reported using at least one tool, 61 reported having a chronic illness and 80 did not report having a chronic illness.

In regard to the use of specific tools, those who used the provider directory included 51 of 61 people with a chronic illness and 67 of 80 people without a chronic illness; no significant difference between subgroups was found. Online disease management tools were used by 14 of 61 people with a chronic illness versus 17 of 80 people who did not report having a chronic illness. This difference was also not statistically significant. With respect to the use of information regarding pharmacy prices, 36 of 61 people with chronic illness sought out this information, compared with 34 of 80 without a chronic illness; this difference was statistically significant (p-value = 0.037).

Are People With Chronic Illnesses More Likely to Anticipate Exhausting Their Health Savings Accounts?

Most CDHP respondents said their expectations regarding spending of savings account dollars were met. Of 560 participants

who responded to these questions, 298 expected to have no dollars left in their accounts at the end of the year and found that, in fact, they did not. In contrast, 142 respondents expected to have funds left in their accounts and reported that they did have funds left. People with chronic conditions were less likely to anticipate having funds left in their savings accounts at the end of the year. The coefficient on 'having a chronic illness' in this estimated probit equation was −0.33, with a p-value of 0.013. Those with a chronic illness **((Author: ok?))**were also less likely to report actually having a balance in the account at the end of the year, with the probit coefficient for 'having a chronic illness' in this equation estimated at −0.34 (p-value = 0.016).

How Do Spending Patterns Differ For CDHP Enrollees With Chronic Illness versus Other CDHP Enrollees?

The proportion of chronically ill CDHP enrollees who ended the year with total spending above the deductible included 76% under single contracts and 79% with family contracts. In contrast, of the non-chronically ill CDHP enrollees, 41% under individual contracts and 44% with family contracts had total spending over the deductible. Conversely, those finishing the year with total spending less than the money contributed to their HSAs, included 15% of people with chronic illnesses under individual contracts versus 40% of people with no chronic illnesses under individual contracts. The corresponding percentages for chronically ill and not chronically ill under family contracts were 4% and 25%, respectively.

As shown in table V, differences in spending patterns were most striking for CDHP enrollees with total spending that exceeded the deductible. In this group, spending on prescription drugs was more than double for those with chronic illnesses under either individual or family contracts, compared with those without chronic illnesses under corresponding contracts. Furthermore, spending for physician services was significantly higher for those with chronic illnesses under individual contracts compared with those without chronic illnesses under individual contracts.

Discussion

CDHPs are used by employers to change the incentives facing their employees in the purchase of healthcare. Most employers do not expect these benefit designs, by themselves, to generate large immediate reductions in their healthcare expenditures.[2] However, they hope that CDHPs will create incentives for employees with chronic illnesses to 'manage' their conditions more effectively by: (i) seeking out comparative information regarding prices and quality of care; and (ii) learning more about disease self-management, using Internet tools provided by the CDHP and other publicly available sources; and (iii) seeking out and participating in employer-sponsored disease management programs. Larger employers see CDHPs as part of a nuanced strategy to contain costs related to medical care and absenteeism over the longer term.[2]

While the findings presented in this article reflect the experience of only one large employed group, they suggest that there is much to be done for this strategy to be effective. Even though the CDHP benefit design was generous, relatively few University of Minnesota employees chose the CDHP, and the CDHP was no more attractive to employees with chronic illnesses than to other employees. To attract employees with chronic illnesses to enroll in CDHPs, employers may need to change CDHP benefit designs. For example, one CDHP has offered a benefit design tailored to provide first dollar coverage for prescription drugs used to treat chronic illnesses,[13] so that these expenses do not exhaust HSAs. Alternatively, CDHPs may not prove attractive to people with chronic illnesses unless the other options offered by employers feature higher deductibles and co-insurance than was the case in the University of Minnesota group.

Our results also suggest that employers need to do more if they want CHDP enrollees with chronic illnesses to 'manage' their conditions more effectively. Although people with chronic illnesses who chose CDHPs had some understanding of how their HSAs would work, they tended to exhaust those accounts and also spend more than the plan's deductible. These data support the speculation by Ross[14] that people with chronic or other serious illnesses "… will easily exceed their deductible" in HSA plans.

Information from a national study suggests that employers are dissatisfied with the quality and relevance of the information tools offered to employees to assist in the management of illnesses.[2] The type and quality of information available to CDHP enrollees was not assessed as part of our study. However, we did find that information tools were more likely to be accessed by CDHP enrollees with chronic illnesses than other CDHP enrollees. In this respect, they could prove to be a significant entry point into a disease management program. Information about participation in disease management programs by CDHP enrollees was also not assessed. However, a case can be made for integrating disease management programs with CDHP benefit designs. They could help to attract employees with chronic illnesses to CDHP products and improve enrollee experience in these products. Whether the result would be lower costs for employers is an open question. Recent research relating to disease management programs implemented in an HMO that offered traditional, comprehensive coverage suggests that these programs can improve quality of care but are unlikely to reduce costs.[15] There is a clear need for parallel research regarding the impact of disease management programs when coupled with CDHP benefit designs.

Table V. Spending patterns for consumer-directed health plan enrollees with a chronic illness compared with no chronic illness

Health plan expenditure**((Author: heading ok?))**	Chronic illness	No chronic illness
Single contract		
Enrollees with annual spending exceeding deductible	n = 62	n = 90
prescription drugs	2638[a]	1233
physician services	3973[b]	2865
hospital	2621	2398
Enrollees with annual spending in the donut hole	n = 11	n = 41
prescription drugs	484	283
physician services	1228	758
hospital	190	250
Enrollees with annual spending within savings account limit	n = 9	n = 88
prescription drugs	83	62
physician services	99	167
hospital	32	66
Family contract		
Enrollees with annual spending exceeding deductible	n = 84	n = 63
prescription drugs	4364[a]	1895
physician services	6648	5947
hospital	4827	6963
Enrollees with annual spending in the donut hole	n = 18	n = 45
prescription drugs	656	571
physician services	1447	1535
hospital	578	559
Enrollees with annual spending within savings account limit	n = 4	n = 36
prescription drugs	548[a]	117
physician services	328	458
hospital	123	78

a $p < 0.01$ (t-test) **((Author: ok?))**.

b $p < 0.05$ (t-test)**((Author: ok?))**.

The benefit design of CDHPs is fairly similar to other designs used in other countries, specifically in China and South Africa.[16] A critical difference is that employers sponsor health benefits in the US. Under the HRA model in the US offered by employers, the balances in HRAs are not 'owned' by employees. The results from this study **((Author: rewording ok?))**may be generalized to employers where the accounts are not actual assets of the individual subscriber. Other countries have designs more similar to the HSA arrangement in the US**((Author: such as? Please provide examples and references))**.

Our study is subject to several limitations. It examined the experience of only one employer in the second year after it adopted a CDHP. The popularity of CDHPs for employees with chronic illness, and the willingness of those employees to use the care management tools of the CDHP, may be a function of their experience with this product. These are both dynamic features that may change over time.

Although the CDHP in our study offered two benefit options, we had to combine them because of small sample sizes. Some of our findings may have been 'averaged away' by combining CDHP options that were relatively more and less generous.

Finally, as mentioned above**((Author: please specify the exact section))**, the experience of employees (e.g. whether they have higher overall expenditures) in a CDHP depends on the features of plans that employers offer as alternatives to the CDHP. As employers increase the out-of-pocket costs in their other health plans, people with chronic illnesses might be more likely to seek care under CDHP coverage than they would in a high-deductible PPO. This question needs to be investigated in future research.

((Author: Other limitations relate to the survey design and potential for response bias? Please comment on these aspects))

Conclusions

((Author: please provide a conclusion section summarizing the main points of your article. The conclusion should indicate what your study may offer to current literature in the area as well as practical implications and highlight areas for further research.))

Acknowledgments

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