The Impact of Personalized Preventive Care on Health Care Quality, Utilization, and Expenditures

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Abstract

The objective of this study was to evaluate the impact on health care utilization and expenditure trends over time of a personalized preventive medicine program delivering individualized care focused on lifestyle behavior modification, disease prevention, and compliance with quality-related metrics. MD-Value in Prevention (MDVIP) is a network of affiliated primary care physicians who utilize a model of health care delivery based on an augmented physician-patient relationship and focused on personalized preventive health care. Multivariate modeling was used to control for demographics, socioeconomics, supply of health care services, and health status among 10,186 MDVIP members and randomly selected, matched nonmembers. Health care utilization and expenditure trends were tracked from the pre period prior to member enrollment for a period of up to 3 years post enrollment. MDVIP members experienced reduced utilization of emergency room and urgent care services compared to nonmembers. Program savings ranges indicated that, over time, increasing percentages of members achieved cost savings compared to nonmembers. Older age groups were more likely to realize savings in the early years with preventive activities indicating condition management, and younger age groups were most likely to achieve savings by the third year after enrollment. These results indicate that a primary care model based on an enhanced physician-patient relationship and focused on quality and personalized preventive care within a time frame of 3 years can achieve positive health care expenditure outcomes and improved health management.

Introduction

EMPLOYERS HAVE INDEPENDENTLY IMPLEMENTED health management programs designed to improve the health of their employee and spouse populations and as one of several strategies to mitigate increasing health care expenditure trends and improve productivity.[1] A 2013 national employer survey by the Kaiser Foundation found that 77% of employers offering health care benefits also sponsored at least 1 wellness program.[2] These programs are based on well-established research documenting that modifiable lifestyle behaviors are associated with health care expenditures[3–7]; more importantly, as health risks change (improve or increase), health care expenditures follow those changes.[8–10] Thus, programs can be positioned to facilitate risk improvement as well as to maintain health among those who currently have few health risks and/or no chronic conditions.

Economic evaluations (return on investment [ROI]) of well-designed, employer-based health management programs have indicated health care expenditure savings generally within 2 to 3 years of program initiation, in addition to longer range savings in subsequent years.[11–16] Most comprehensive employer health management programs are administered by selected vendors and directed by dietitians, exercise physiologists, and/or nurse counselors outside of the direct purview of primary care physicians (PCPs). Physician reviews are generally positioned to be provided for those with very high health risks and/or complex medical issues (ie, high health care expenditures).[17]

Additionally, health care professionals, especially PCPs, can motivate patients under their care to implement lifestyle modifications. Research has shown that adults who recalled receiving advice from a physician or health care professional were more likely to change their eating habits, exercise, maintain a healthy weight, and/or reduce sodium and

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alcohol intake.[18] However, even though PCPs identified lifestyle counseling as a key area of their work, counseling is not offered consistently during office visits.[19] Physicians who did provide lifestyle counseling often were influenced by their own personal health habits: those who exercised, were nonsmokers, and maintained healthy dietary habits were more likely to counsel on these topics.[20] Obstacles to effective lifestyle counseling by PCPs have been identified, including lack of time, reimbursement, and training, as well as physician skepticism regarding patient adherence.[21,22]

Wellness and prevention strategies and programs implemented through an employer or directed by a physician can minimize the progression of individuals from lower risk status (whether measured as no/few health risks or as no disease) to higher risk status (more health risks and/or newly diagnosed disease) as they age. Improved health over time can provide more quality years of life for the individual, reduce the prevalence of chronic disease and disability, as well as mitigate health care expenditures during a lifetime.[17,23,24] Maintaining healthy behaviors in midlife (ages 40–50 years) has been shown to be predictive of higher percentages of morbidity-free survival in older age (eg, 85 years).[25,26]

A recent report from the Milken Institute supports this perspective. Lifestyle modifications that include healthy eating, physical activity, and nonsmoking, along with compliance with other clinical preventive services, can be cost-effective strategies to moderate the development of chronic conditions.[27] For instance, strategies to reduce heart disease have been most successful in lowering the prevalence and reducing the economic burden of this disease.[28] Much credit for this reduced trend is associated with antismoking initiatives. Furthermore, identifying strategies for remaining healthy, vigorous, and disability-free at older ages has become a major priority, as reflected by the US Surgeon General's Healthy People 2020 objectives for older people.[29]

Personalized medicine is a relatively new approach to health care delivery that seeks to leverage the physician in promoting healthy lifestyle behaviors, identifying and preventing disease, addressing the issues of care coordination, and providing preventive care to populations of employees and their spouses.[30–32] The model is based on individualized care, integrating personalized preventive medicine and wellness management, while delivering high levels of coordination within the treatment milieu. The delivery system includes greater focus on evidence-based preventive services, increased physician availability to improve management of patient health, and increased access to other health care resources.[30–32]

The purpose of this study is to evaluate the impact of a personalized preventive care program on health care utilization and expenditure trends for up to 3 years post enrollment. In addition, characteristics and percentages of those individuals who achieved positive cost savings (defined as exceeding monthly membership fees) in years 1, 2, and 3 were documented.

Methods

MD-Value in Prevention (MDVIP) practice model

MDVIP's model of comprehensive management focuses on personalized preventive health care by delivering an annual 60- to 90-minute appointment that includes health screenings (eg, depression, anxiety, sleep, nutrition, sexual function, vision,

hearing), diagnostics (eg, screening for diabetes, bone disease, cardiovascular disease), and personalized coaching and online tools for nutrition and exercise for a membership fee (paid by the patient) of approximately $125 to $170 per month.[30–32] The patient receives an ''executive-style physical'' and works with his or her physician to achieve identified wellness goals. Practices are limited to no more than 600 patients per physician, allowing physicians added time and resources to deliver additional services and provide personalized attention required for management of each patient's relevant health issues. With smaller practice sizes, members receive same-day or next-day appointments for urgent and nonurgent care and the ability to reach their PCP 24 hours a day by phone, e-mail, or text. Physicians also work with their patients out of the office to teach them how to achieve their goals with events like ''walk with the doc,'' ''ride (bicycles) with the doc'' or ''shop (grocery stores) with the doc.''

The network currently includes more than 700 affiliated physicians practicing in the model and more than 250,000 patients nationally. Affiliated physicians have an average age of 59 and are 70% internists and 30% family practitioners. On average, members are 66 years of age and 50%–55% are enrolled in employer-funded health plans.

The model is not a third-party payer (eg, health insurance) and the fees cover only the extended prevention and wellness services provided by the PCP; therefore, members still pay, via conventional mechanisms (ie, health insurance) for inpatient and outpatient visits, services provided by specialists, and other medical services (eg, laboratories, X-rays). The underlying premise of the model is that the focus on prevention and wellness and the additional time, attention, and access to physicians (ie, higher quality of care delivery) will lead to better health status, lower emergency room (ER) visits and hospital utilization, and ultimately lower health care expenditures. Table 1 summarizes key distinguishing characteristics of MDVIP practices compared to traditional practices as experienced by employees and spouses in employer-sponsored health plans.

Study population

MDVIP members were identified from UnitedHealthcare employer-sponsored health plan databases using 2009–2014 enrollment files provided by MDVIP. Eligibility for this study was defined as being between the ages of 35 to 84 years and having continuous health plan membership with a minimum of 3 months prior to MDVIP enrollment and a minimum of 3 months and up to 36 months following MDVIP enrollment during the years 2009–2014. Nonmembers were randomly selected from UnitedHealthcare employer-sponsored databases. Eligibility for nonmembers was defined as for members: ages 35 to 84 years and having continuous health plan membership for a minimum of 3 months prior to a matched range of enrollment dates with a minimum of 3 months follow-up and up to 36 months post-enrollment dates (2009–2014). Health care expenditure outliers were removed at the 99.5[th] percentile along with those with no claims (ie, $0) in a given year to provide equalized distributions of health care expenditures for members and nonmembers.

Control variables

Control variables included member demographics (eg, age, sex, plan type, region of the United States, metropolitan

TABLE 1. CHARACTERISTICS OF MDVIP PRACTICES AND TRADITIONAL PRACTICES

MDVIP Practice	Traditional Practice
Physicians focused on early risk detection and prevention of disease	Physicians focused on diagnosis and control of chronic conditions
≤ 600 patients per physician	>2400 patients per physician
8–12 patients per day seen by physician	30–35 patients per day seen by available provider
Care delivered only by personal physician	Care delivered by available physicians/extenders
30–90 minutes per visit	<8 minutes per visit
Personal physician available 24/7	Emergency "on-call service"
MDVIP physician network available when traveling	Walk-in clinics or emergency rooms when traveling
Coordination of care (ie, specialists, hospitalists)	Little coordination of care or follow-up
Patients get all their questions answered	Patients don't have time to ask questions
Same-day appointments	Average 4–6 weeks for appointment
On-time appointments	Waiting rooms
Proactive coaching outside of the office	Patient responsible for own education and exercise, among others

MDVIP = MD-Value in Prevention.

location), socioeconomics (eg, income), supply of health services (eg, number of acute care hospital beds, specialists, PCPs), and health status (eg, Charlson Comorbidity Index [CCI], Psychiatric Diagnostic Group [PDG] score, number of inpatient admissions) in the pre period. Insurance plan types included exclusive provider organization, health maintenance organization, indemnity, point of service, preferred provider organization, and others. Regions of the United States were based on zip codes and assigned as Northeast, Midwest, South, or West. Median household income ranges were reported as high (≥$45,809), medium-high (≥$36,250 and <$45,809), medium (≥$29,875 and <$36,250), or low (<$29,875) based on whether the median income in the individual's zip code area was in the highest, second-highest, third-highest, or lowest quartile in 2010, according to US Census records. Location was defined as living in a metropolitan area (population ≥50,000) or other. Supply of health care services was defined based on the number of PCPs and specialists (per 100,000) and hospital beds (per 1000) in the member/nonmember zip codes of residence.

Health status was determined from medical claims diagnoses and place of service utilization and included the CCI (=0, 1+),[33] PDG (=0, 1+),[34] and the annual number of inpatient admissions. The CCI is a measure of the risk of 1-year, all-cause mortality attributable to selected comorbidities. PDGs are validated psychiatric diagnostic groups analogous to major diagnostic groups in the diagnostic-related group system but provide better classification of individuals with substance abuse and/or mental health disorders. Variables denoting missing data were included in the analyses; however, for brevity, results associated with missing data are not shown in the tables included in this article but are available upon request.

Modeling

Three sets of analyses were conducted to: (1) describe the characteristics of the members, (2) propensity score match randomly selected nonmembers to member characteristics, and (3) utilize multivariate regression models to estimate health care utilization and expenditures trends associated with the MDVIP program over time.

Descriptive. The first set of analyses categorized members by demographics, socioeconomics, supply of services,

and clinical characteristics, and compared members to randomly selected nonmembers using univariate techniques without adjusting for case mix differences. This was done to determine if case mix differences needed adjustment between the groups prior to comparing the outcome variables. Chi-square and Student t tests were used in these analyses to test for differences in categorical and continuous variables, respectively. All analyses were performed using SAS software, version 9.2 (SAS Institute Inc., Cary, NC).

Propensity matching. Propensity score matching was used to minimize case mix differences between members and nonmembers. In this second set of analyses, a logistic model was used to estimate the likelihood of enrolling in the program. The variables used in the model were those previously described. The propensity score for each sample individual was defined as each member's predicted probability of being in the program. This probability was then used to match members to similar nonmembers. Propensity score matching is a convenient and acceptable way to remove case mix differences when evaluating health and wellness programs.[35,36]

Second-stage regressions are often warranted to remove any remaining case mix differences after matching and to adjust for skewed medical expenditure distributions that are often common in health care. In a final set of medical expenditure statistical analyses, Exponential Conditional Mean (ECM) regression models were used to estimate the impact of the program on medical expenditure trends compared to nonmembers.[37]

Health care utilization

Utilization of medical services was examined to provide a mechanism that could potentially drive changes in health care expenditure trends. Utilization metrics included annual rates of urgent care visits, ER visits, inpatient admissions, and readmissions comparing members to matched nonmembers.

Changes in health care expenditures pre enrollment to years 1, 2, and 3 post enrollment

ECM regression-adjusted health care expenditures were focused on pre enrollment total health plan paid medical and

pharmacy costs, and patient co-payments compared to year 1, year 2, or year 3 post enrollment cost trends for members compared to matched nonmembers (difference-in-difference [DID] design). Membership fees paid by the members were not included in this evaluation as they are not relevant to the savings realized by the health plan.

Cost savings ranges (DID) years 1, 2, and 3 post enrollment

In addition to calculating overall changes in health care expenditures pre enrollment to post enrollment by year, the research team considered cost savings for the following ranges of savings: ≤-$1000; -$999 to -$500; -$499 to -$300; -$299 to -$150; -$149 to -$100; -$99 to -$50; -$49 to -$0.1; $0.1 to $49; $50 to $99; $100 to $149; $150 to $299; $300 to $499; $500 to $999; and ≥$1000. The team then determined the percentage of members who achieved cost savings or losses in each of the determined ranges for years 1, 2, and 3.

Characteristics associated with achieving $150 per member per month (PMPM) or more cost savings

Membership fees for MDVIP programs average about $150 per month and are paid by the patient. For the MDVIP program to break even in total, cost savings from health care expenditures would need to meet or exceed $150 PMPM. With the understanding from employer health management programs that prevention programs need 2 to 3 years to achieve positive ROIs, logistic regression models were used to determine characteristics associated with achieving $150 PMPM or greater savings for years 1, 2, and 3. The covariates already described were tested as predictors of positive savings.

Results

The initial study populations included 13,200 MDVIP members and 94,599 nonmembers, resulting in 11,396 propensity-matched members and nonmembers. Outliers were excluded at the top 0.5th percentile of annual health care expenditures, resulting in 992 cases being deleted from the member and nonmember subgroups. The final study population included 10,186 (1 year), 5908 (2 year), and 3915 (3 year) members and nonmembers who met the eligibility criteria. As shown in Table 2, members differed from nonmembers on most of the demographic, socioeconomic, supply of services, and health status variables, demonstrating the need for propensity score matching to adjust for these case mix differences. Most of the significant differences in characteristics between members and nonmembers were eliminated or minimized with the matching methodology.

Utilization trends for years 1, 2, and 3, investigated to document the potential source of health care savings, indicated significantly lower rates for ER visits and urgent care facility use (Table 3). Readmission rates were significantly different in year 1 only; there were no significant differences in inpatient admission utilization over the 3 years, but the absolute numbers of these were small.

Average medical and pharmacy expenditure trends for years 1, 2, and 3 indicated that members' cost trends exceeded those of nonmembers (matched, regression-adjusted, and excluding outliers): members' expenditures increased by $85.63 PMPM in year 1 ($P < 0.001$; standard deviation

[SD]: $45.20), by $29.16 PMPM in year 2 ($P = 0.23$; SD: $15.37), and by $2.17 in year 3 ($P = 0.94$; SD: $1.15) from their relative baseline expenditures prior to enrollment. Thus, health care expenditure trends over the 3 years indicated that, although members incurred significantly higher costs in year 1, the gap narrowed over time such that by year 3, members' and nonmembers' expenditures were similar.

The overall MDVIP program indicated a trend toward breaking even over the 3-year time period. To demonstrate cost ramifications of better health management, the research team tracked the percentage of members who achieved at least $150 PMPM in savings (based on the average membership fee of about $150 PMPM). In year 1, 24% of individuals met this success measure; in year 2, 26%; and in year 3, 63% met this minimum savings amount with most members (about 30%) saving between $150–$299 PMPM and an additional 16% saving between $300–$499 PMPM. In contrast to average health care expenditures for a population, percentages of those who meet a defined success measure (eg, exceeding the membership fee costs) provide an additional indication of the successful penetration of program impact among member subgroups.

Characteristics associated with achieving $150 PMPM or greater savings changed over time (Tables 4a, 4b, and 4c). In year 1, those more likely to achieve savings had more chronic conditions, took greater numbers of prescription drugs, and were older (ages 55–64 years). In year 2, those more likely to achieve savings still had more chronic conditions but were younger (ages 35–64) and took more prescription drugs. By year 3, however, those members who were more likely to achieve savings had no distinguishing age or chronic condition characteristics, an indication that savings were generated from prevention rather than chronic condition management.

Discussion

MDVIP has implemented a personalized medicine program focused on promoting healthy lifestyle behaviors and identifying and preventing disease, all while addressing care coordination and delivery of preventive care to populations of employees and their spouses. The model leverages the physician, who provides an annual 60- to 90-minute wellness visit that includes health screenings, diagnostics, and personalized coaching for nutrition and exercise. Smaller practices with fewer patients per physician allow for personalized attention and greater access to physicians 24 hours a day by phone, e-mail, or text, as well as availability for same-day appointments. Members experienced reduced utilization of ER and urgent care services and increased health care expenditure savings over time compared to nonmembers.

Extending the time of wellness visit lengths to 60–90 minutes removes one of the major barriers cited by physicians as hampering their ability to counsel on lifestyle modification. This is in contrast to the median visit length of 15.7 minutes in a typical PCP office covering a median of 6 topics.[38] MDVIP recruits physicians who have an interest in wellness and prevention coaching in addition to their medical credentials. Ongoing physician education, accessible tools, and national conferences augment those skills. These opportunities address a second commonly acknowledged barrier of lack of self-efficacy in motivating patients to change lifestyle behaviors (especially for weight management).[21] Evidence of

TABLE 2. DEMOGRAPHICS* FOR MDVIP MEMBERS AND RANDOM CONTROLS:
PRIOR TO AND AFTER PROPENSITY SCORE MATCHING

	Unmatched			Propensity Score Matched		
	MDVIP Members	Random Sample Controls	P	MDVIP Members	Random Sample Controls	P
	Mean or % 11,396	Mean or % 62,721		Mean or % 10,186	Mean or % 10,186	
Age (average)	55.7	49.3	<0.001	54.8	54.0	<0.001
35–44	11.2	33.9	<0.001	12.5	12.7	0.91
45–54	31.0	34.9		33.4	33.7	
55–64	45.6	28.4		45.2	44.9	
65+	12.3	2.9		9.0	8.8	
Sex						
Male	47.9	42.4	<0.001	47.3	47.6	0.65
Female	52.1	57.6		52.7	52.4	
Employment Status						
Employee	63.6	67.8	<0.001	64.7	64.9	0.73
Spouse	36.4	32.2		35.3	35.1	
Median household income (geocoded from zip code)						
High (≥$45,809)	68.0	55.9	<0.001	66.5	67.4	0.67
Upper Medium (≥$36,250 and <$45,809)	18.1	20.6		18.6	18.1	
Lower Medium (≥$29,875 and <$36,250)	6.2	11.6		6.6	6.5	
Low (<$29,875)	3.6	6.7		3.9	3.7	
Region (geocoded from zip code)						
Northeast	11.7	18.2	<0.001	12.2	12.4	0.57
Midwest	9.7	18.6		10.6	10.8	
South	60.5	44.6		58.4	57.3	
West	17.3	17.3		17.9	18.5	
Location (geocoded from zip code)						
Metro	95.8	89.7	<0.001	95.5	95.7	0.41
Others	4.2	10.3		4.5	4.3	
Plan Type						
EPO	7.5	11.0	<0.001	8.1	8.1	0.57
HMO	3.2	0.9		2.2	2.1	
Indemnity	2.0	0.9		1.3	1.3	
POS	72.4	68.1		73.1	73.9	
PPO	7.6	11.3		7.9	7.2	
Others	7.3	7.7		7.5	7.4	
Supply of Medical Services by Location (geocoded from zip code)						
Acute Care Hospital Beds per 1,000	2.1	2.3	<0.001	2.2	2.2	0.54
PCPs per 100,000	68.7	70.7	<0.001	68.9	69.0	0.63
Specialists per 100,000	130.7	129.2	<0.001	131.0	127.8	<0.001
Charlson Comorbidity Index (CCI)	0.51	0.36	<0.001	0.48	0.48	0.90
CCI=0	71.4	78.4	<0.001	72.5	73.1	0.34
CCI >=1	28.6	21.6		27.5	26.9	
Psychiatric (PDG)	0.17	0.14	<0.001	0.17	0.16	0.39
No (score=0)	87.5	89.5	<0.001	87.6	87.7	0.77
Yes (score >=1)	12.5	10.5		12.4	12.3	
Any Inpatient Admission	6.2	5.3	<0.001	6.0	5.8	0.55
% Readmission Within 30 Days	9.3	7.0	0.03	8.8	6.9	0.22
Any Emergency Room Visit	13.8	14.1	0.35	13.6	14.4	0.08
Any Urgent Care Facility Use	4.7	6.6	<0.001	5.0	5.0	0.90
Number of Therapeutic Drug Classes	1.3	1.2	0.02	1.3	1.3	0.17
0	41.8	48.9	<0.001	42.4	43.2	0.65
1–3	48.9	41.2		47.5	47.1	
4–6	4.5	5.5		5.0	4.9	
7–9	2.4	2.6		2.6	2.5	
10 or more	2.4	1.8		2.6	2.3	

*Excluding outliers and zeros.

EPO=exclusive provider organization; HMO=health maintenance organization; MDVIP=MD-Value in Prevention; PCP=primary care physician; PDG=Psychiatric Diagnostic Group; POS=point of service organization; PPO=preferred provider organization.

TABLE 3. REGRESSION-ADJUSTED HEALTH CARE UTILIZATION YEARS 1, 2, AND 3 FOR MEMBERS
AND MATCHED NONMEMBERS

	Members %	Nonmembers %	P
Year 1			
Any IP Admission	5.9	5.8	0.74
Readmission Within 30 Days	10.9	12.5	<.001
Any ER Visit	10.8	10.2	0.72
Any Urgent Care Facility Use	2.7	5.5	<.001
Year 2			
Any IP Admission	5.5	5.3	0.65
Readmission Within 30 Days	9.0	11.2	0.35
Any ER Visit	10.0	12.7	<.001
Any Urgent Care Facility Use	3.2	6.7	<.001
Year 3			
Any IP Admission	7.1	7.6	0.46
Readmission Within 30 Days	9.0	10.1	0.63
Any ER Visit	14.6	17.3	0.001
Any Urgent Care Facility Use	4.5	10.1	<.001

Notes: 1 year – N = 10,186; 2 years – N = 5908; 3 years – N = 3915.
ER = emergency room; IP = inpatient.

the success of the MDVIP wellness visit model is documented in that most members take advantage of this membership benefit and schedule their annual wellness reviews. (Telephone communication; Dr. A. Klemes; October 2015.)

Spending more time with patients and physician counseling on behaviors have been associated with higher trust among patients.[39] In turn, trust in one's physician has been linked to improvements in many factors, including patient-physician communications, satisfaction with health care, compliance with medical protocols, and continuity of care. Strengthening patient-physician relationships may be an important strategy to enhance patient engagement and mo-

tivation to adopt healthy lifestyle behaviors.[39] Managing lifestyle health risks remains especially important to patients in midlife and as they age to delay the onset of disease and disability and to facilitate the management of existing chronic conditions.[23,24,40]

Medical services utilization patterns indicated a significantly reduced use of the ER in years 2 and 3 and urgent care facilities in all 3 years. This is consistent with greater access to the patient's PCP, thus reducing the need to seek care in outside facilities. Neither inpatient admission rates nor readmission utilization were impacted by membership. It is noteworthy, however, that inpatient admissions and subsequent readmissions were relatively low given that this is an employee/spouse population with an average age of 55 years.

TABLE 4A. YEAR 1 CHARACTERISTICS ASSOCIATED
WITH ACHIEVING $150 PER MEMBER
PER MONTH (PMPM) IN SAVINGS

Characteristic	Odds Ratio	P
Pre CCI ≥2	2.87	<.0001
Pre PDG ≥1 (Mental health)	2.16	<.0001
Pre CCI = 1	1.84	<.0001
Age 55–64 years	1.27	0.01
Pre Number of Therapeutic Drug Classes 4+	1.27	0.005
Northeast	1.22	0.01
Female	1.17	0.002
Pre Number of Therapeutic Drug Classes 1-3	1.13	0.02
Months of Follow-up in Pre Period	1.07	<.0001
HMO	0.41	<.0001

Notes: N = 10,186.
Break-even was considered $150 PMPM, matching average member enrollment fees.
CCI = Charlson Comorbidity Index; HMO = health maintenance organization; PDG = Psychiatric Diagnosis Group.

TABLE 4B. YEAR 2 CHARACTERISTICS ASSOCIATED
WITH ACHIEVING $150 PER MEMBER
PER MONTH (PMPM) IN SAVINGS

Characteristic	Odds Ratio	P
Pre CCI ≥ 2	3.18	<.0001
Pre CCI = 1	2.28	<.0001
Pre PDG ≥ 1 (Mental health)	2.16	<.0001
Age 35–44 years	1.63	0.002
Age 55–64 years	1.58	0.001
Age 45–54 years	1.55	0.002
PPO	1.40	0.002
Pre Number of Therapeutic Drug Classes 1–3	1.15	0.03
Employee	0.80	0.001
HMO	0.49	0.005

Notes: N = 5908.
Break-even was considered $150 PMPM, matching average member enrollment fees.
CCI = Charlson Comorbidity Index; HMO = health maintenance organization; PDG = Psychiatric Diagnosis Group; PPO = preferred provider organization.

TABLE 4C. YEAR 3 CHARACTERISTICS ASSOCIATED
WITH ACHIEVING $150 PER MEMBER
PER MONTH (PMPM) IN SAVINGS

Characteristic	Odds Ratio	P
Low Income Zip Code Area	1.59	0.03
Northeast	1.34	0.009
West	1.32	0.004
EPO	1.31	0.04
Female	1.16	0.044
Pre Number of Therapeutic Drug Classes 1–3	0.85	0.02
Pre CCI = 1	0.77	0.005
Pre Number of Therapeutic Drug Classes 4+	0.28	0.001

Notes: N = 3915.
Break-even was considered $150 PMPM, matching average member enrollment fees.
CCI = Charlson Comorbidity Index; EPO = exclusive provider organization.

Health care expenditure trends indicated increased medical costs for members in year 1 (primarily associated with increased prescription drug use—consistent with better management of chronic conditions). Ongoing health management and care coordination over years 2 and 3 minimized the differences between members and nonmembers such that by year 3, the expenditures were similar. Although expenditure levels were nearly identical for members and nonmembers by the third year, one might suggest that consistent health management within the context of the MDVIP program would result in higher quality care for dollars spent.

These results are consistent with previously published MDVIP studies that demonstrated improved quality of care, increased compliance with recommended preventive services compared with traditional practices,[31] and reduced hospital utilizations consistently over a 5-year time period among members versus nonmembers.[30] The member/nonmember cost difference pattern over the 3 years is similar to the cost-saving trends experienced in employer-based health management programs' economic evaluations (ie, ROIs). Most well-designed employer wellness/prevention programs require 2 to 3 years after program initiation to realize cost savings that exceed the investment of these programs.[11–16] These health care cost trends also were similar to a previous study focused on Medicare Advantage beneficiaries enrolled in the MDVIP program.[32] Members experienced significantly reduced utilization of ER services, inpatient admissions, and reduced health care expenditures through the first 2 years of the program.

It was of interest to characterize those members who achieved some level of cost savings over the years. The research team used the average membership fee of $150 per month as the "cost of the program" and subsequently identified characteristics associated with those who exceeded this level in health care cost savings. In the first year, those with more chronic conditions, who used more prescription drugs, and who were older were more likely to achieve cost savings exceeding $150 PMPM. Interestingly, however, by year 3 after enrollment in MDVIP, cost savings were generated primarily by younger members with fewer/no chronic conditions and lower levels of prescription drug use, therefore likely associated with lifestyle behavior modification. Although the research team could not document changes in health risks, savings in employer-based programs for similar populations of employees/spouses are driven by improvements in health management, including risk reduction and helping individuals stay healthier over time.[10,17] Increases in either health risks or disease prevalence for these younger members should have been reflected in increased health care expenditures rather than the observed decreases compared to nonmembers over time.[3–7]

Additional evidence for the moderating cost trends experienced by members compared to nonmembers is demonstrated in the proportion of members who achieved savings of $150 PMPM or more across the years. In years 1 and 2, 24% to 26% achieved savings at this level. By year 3, 63% (most between $150 and $299 per month savings) had achieved positive savings at or above their monthly membership fees, marking a shift over time to increased proportions of the population achieving savings.

Limitations include a study population enrolled in health plans provided by a single insurer, which may not be generalizable to all employer health plans. The control population was randomly selected from UnitedHealthcare employer health plan databases and propensity matched to the MDVIP member populations. Although these statistical approaches are sophisticated and rigorous, unknown differences between the populations (eg, motivation regarding health attitudes) may not have been addressed. Strengths of the study include the large study populations and the longitudinal tracking over 3 years, along with the use of advanced statistical approaches.

These results demonstrate that a model of personalized preventive care focused on wellness and prevention and augmenting the physician-patient relationship can improve health management and reduce health care utilization and expenditures within populations of employees and their spouses. Health status at midlife is especially critical to maintaining health while aging, delaying disease and disability onset, managing existing chronic conditions, and enhancing quality of life and well-being during a lifetime. Personalized preventive care programs, such as that offered by MDVIP, provide an alternative primary care model that can help individuals achieve these health goals.

Author Disclosure Statement

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