

# Worksite Medical Home: Health Services Use and Claim Costs

Christopher Conover, PhD; Rebecca Namenek Brouwer, MS; Gale Adcock, MSN, RN, FNP-BC, FAANP; David Olaleye, PhD, MSCe; John Shipway, BS; and Truls Østbye, MD, PhD

The United States spends more per capita on health care than any other nation,<sup>1</sup> and employers pay more than a quarter of this total.<sup>2</sup> Regular access to primary care can help curb healthcare costs through increased use of clinical preventive services, reduced hospitalizations, appropriate follow-up of chronic conditions, and greater continuity of care.<sup>3-6</sup>

The “medical home” may be a good model for improving the health of employees through high-quality and readily accessible healthcare at the workplace.<sup>7-10</sup> First introduced in 1967,<sup>11</sup> “medical home” has recently been described as a place where patients receive “acute, chronic, and preventive services” that are “accessible, accountable, comprehensive, integrated, patient-centered, safe, scientifically valid, and satisfying to both patients and their physicians.”<sup>12</sup>

While many employers offer health promotion programs of various intensity and scope, we use the term “workplace medical home” to denote a set of more comprehensive primary care services at the worksite, offering acute care and chronic disease management in addition to clinical preventive services provided by nurse practitioners and physicians. This idea has caught on: the number of companies creating in-house healthcare opportunities is increasing, with reports of 23% to 30% of mid-sized and large employers (500 or more employees) now providing on-site or near-site clinics for employee health.<sup>13-15</sup> The creation of employer-based primary care clinics, sometimes even including pharmacies, may be a response to an otherwise unsatisfactory and sometimes failing primary care system, as a way to reduce direct healthcare costs assumed by the employer, and/or to attract and retain employees. Employers may increasingly recognize the connection between employee health and work performance.

While worksite medical homes appear to produce economic benefits in terms of lower health plan spending and higher worker productivity, the indirect benefits are of great importance: companies providing on-site healthcare are do-

## ABSTRACT

**Objectives:** To examine the relationship among use of an on-site employer-provided primary care medical home, and health services use and health plan costs for inpatient and outpatient services and pharmaceuticals.

**Study Design:** The study was a retrospective observational analysis of health plan claims, human resources data, and Health Care Center (HCC) encounters.

**Methods:** Three years of data for employees and dependents designating the HCC as their primary care provider (HCC major users) were compared with data from 2 comparison groups: “casual” HCC users and HCC nonusers. The outcomes of interest were: 1) health services utilization, and 2) monetized use of the health plan. Secondary data from an employer-provided Health Care Center (HCC) were also included.

**Results:** After adjusting for several potential confounders, HCC major users had less use of external healthcare services than the comparison groups (employees had 2.7 fewer external encounters than HCC casual users [ $P < .001$ ] and 1.2 fewer external encounters than nonusers [ $P < .001$ ]; dependents had 3.5 fewer external encounters than HCC casual users [ $P < .001$ ] and 1.9 fewer external encounters than non-users [ $P < .001$ ]). Annual monetized use of the health plan for employees and dependents was highest for HCC casual users relative to HCC major users (employees: \$482 greater,  $P < .01$ ; dependents: \$598 greater,  $P < .001$ ).

**Conclusions:** Employees and their dependents who were “casual users” of the HCC had the highest claims costs and use of outside healthcare services. Additional research is needed to assess the extent to which employees’ utilization of services at on-site primary care medical homes affects employee health outcomes, resulting in potential effects on company healthcare plan expenditures, worker productivity, and return on investment.

*Am J Manag Care. 2015;21(7):e422-e429*

ing well for their employees. Gemignani reported that employees cite satisfaction with convenience of location, payment, and lack of claims to file.<sup>16</sup> Turner found that 95% of employees from a midwestern manufacturing plant offering on-site primary care would recommend the worksite clinic to coworkers, and 96% would themselves return for care.<sup>7</sup> Worksite medical homes may also benefit employers by reducing the number of emergency episodes, ambulatory care-sensitive hospital admissions, and/or total cost of healthcare for an employer-sponsored health plan. Berry et al concluded that successful employee health centers are those created for the right reasons, including encouraging an attitude of wellness, convenient access to a high-quality medical home, conveying a company's commitment to employees, improving productivity, reducing turnover, and achieving better control of healthcare costs.<sup>17</sup>

The objective of this study was to explore the relationship among the extent of use of an on-site, employer-provided primary care medical home at a large North Carolina employer and: 1) health services utilization both in the Health Care Center (HCC) and in the community, and 2) health plan claims costs monetized using standardized prices. Employees at this workplace included 3 subject cohorts with varying degrees of "exposure" to the primary care medical home. What is unique about our study is that we have separately tracked HCC use and health plan use so that we can examine the extent to which on-site HCC use might substitute for use of care in the community.

## METHODS

### Design

**Setting.** SAS Institute Inc (SAS) is the world's largest privately held software company, with more than 13,700 employees worldwide, and approximately 5200 employees working at the company's global headquarters in Cary, North Carolina. Since 1984, Cary has had an on-site HCC, which has served as a "workplace medical home" since 1996 for employees and their dependents covered by SAS health insurance. The HCC operates during company weekday business hours, offering after-hours care through an answering service and rotating on-call physicians and nurse practitioners, who along with other health professionals provide a full range of primary care services. The HCC provides diagnosis and treatment of acute episodic illnesses, triage and treatment of emergencies, chronic disease management, and specialist referrals as needed.

### Take-Away Points

"Casual users" of an on-site medical home had the highest claims costs and use of outside healthcare services. While "major users" of the on-site medical home had higher use of on-site services, they had lower claims costs than the other groups for outpatient claims.

- Use of on-site medical homes is associated with decreased total use of outpatient care including preventive care services.
- Whether on-site clinics save money is dependent on the cost of on-site care delivery in the context of avoided claims costs.
- Analytics software can help employers monitor and evaluate on-site and external use of health services.

During this study's timeframe, employees could choose between a networked preferred provider organization (PPO) plan and an indemnity plan for theirs and their dependents' company-sponsored health insurance coverage. In addition to their choice of health plan, all employees and their dependents could choose between the on-site HCC or a community provider for primary care.

**Subjects.** This was a retrospective cohort study comparing HCC utilization in a group of patients who designated the HCC as their primary care provider relative to 2 comparison groups. The study population was every benefits-eligible employee during the entire 3-year study period and their dependents. The 3 mutually exclusive groups were: 1) HCC "major users," who designated the HCC as their primary care provider; 2) HCC "casual users," who designated primary care providers outside of the HCC, but who used other HCC services at least once during the 3-year study period; and 3) HCC nonusers who neither designated HCC as their provider nor used the HCC at all during the study period. Any employee or dependent who changed groups in the 3-year period was excluded from the analysis. The proportion of cases in this category was small and had no appreciable effect on study results.

### Data

For the current study, data from SAS human resources databases (for demographics, type of position, etc); insurance claims databases (for external health encounters and claim costs); and the HCC database (for internal encounters) were linked by SAS personnel. During the study period, SAS offered enrollment in either an indemnity plan or a PPO plan, each administered by a different third-party administrator (TPA): a Blue Cross Blue Shield (BCBS) PPO or a United Medical Resources (UMR) indemnity plan using the same plan design. These TPAs paid health claims submitted directly to them with funds provided by SAS based on projected spending and claims handling/administrative costs. Because the proportion of individuals who had selected UMR varied greatly across the 3

groups, all utilization was standardized and monetized using 2009 payment rates from BCBS North Carolina. Thus, observed “simulated” spending differences across groups are due to utilization rather than to “price” differences.

Random identification numbers were assigned to each plan member, and the data set was de-identified prior to analysis. The study was approved by the Duke University Medical Center Institutional Review Board.

### Statistical Analysis

Preliminary analysis revealed the nonnormal distribution of our primary outcome variables; we therefore used the logarithmic transformation of each variable in the regression model. The SAS/GLIMMIX procedure was used to fit separate models for each outcome (annual monetized use and specific healthcare services use), examining the differences in the outcome measure across the 3 groups adjusted for the effects of covariates. The procedure allows for fitting statistical models to data with nonconstant variability and when the response variable is not necessarily normally distributed (SAS Institute 2012). Covariates included in the model are demographic characteristics (ie, age, gender, race/ethnicity); employee characteristics (ie, duration of SAS employment, full-time worker status, job classification, earnings quintile, and number of dependents); the individual’s health status that measures the presence or absence of 5 chronic diseases (hypertension, heart disease, type 1 or 2 diabetes mellitus, asthma, and stroke, as well as total number of aforementioned chronic diseases); and study year. The 5 chronic diseases were selected because of their high public health impact in terms of frequent occurrence, severity, and chronicity. Differences in all outcome variables among groups were estimated using adjusted means, with *P* values adjusted for multiple comparisons using the Tukey-Kramer method.

The primary outcome of interest was annual monetized use, defined here as the sum of all utilization reported in actual health claims. Utilization was monetized using standardized pricing for each unit of service. Annual monetized use data are derived from actual health plan claims for employees and their dependents paid by SAS during the period from January 1, 2006, to December 31, 2008. We also investigated more specific health services use: 1) inpatient utilization (including hospital and post acute nursing home stays); 2) outpatient utilization (including preventive and acute/chronic encounters); 3) inpatient expenses; 4) labor and delivery expenses; 5) emergency department costs; 6) ambulatory care expenses; and 7) prescription drug use. Current Procedure Terminology-4 codes were used to divide ambulatory encounters into preventive and acute/chronic care.

## RESULTS

### Sample Characteristics

Characteristics of the 3 comparison groups are provided in **Table 1**. The average age of employees was about 45 in all 3 groups, whereas among dependents, there was a notable difference in age among HCC major users (27.6 years) and HCC casual users (19.8 years) or nonusers (21.3 years). There were substantial gender differences across the employee groups, ranging from 51% female among HCC major users, to only 28% among nonusers ( $P < .001$ ), with much smaller gender differences in the dependent groups. Differences in race/ethnicity among the groups were relatively small, but there were sizeable differences in employment duration with SAS. The groups did not differ significantly in representation from various job classes (ie, managerial versus sales). The share of workers in the highest income quintile was more than twice as large for nonusers (38.9%) than HCC major users (18.9%;  $P < .001$ ); this differential was less pronounced among dependents (34.3% vs 22.5%) but remained statistically significant ( $P < .001$ ). Finally, employees in the nonuser group were somewhat sicker than employees in the other 2 groups, having both a higher number of chronic diseases and a higher likelihood of suffering from at least 1 of the chronic conditions examined. In contrast, dependents in the HCC major users were somewhat sicker than dependents in the other 2 groups using the same metrics.

### Health Services Use by Employees

In both adjusted and unadjusted analyses, the number of annual external outpatient encounters was lower among the HCC major users than among the other 2 groups ( $P < .001$ )—a pattern repeated for acute care ( $P < .001$ ) and preventive care encounters ( $P < .001$ ). The vast majority of those HCC encounters for HCC major users (7.5 of the 7.9 per year) were acute/chronic encounters. The average number of annual hospital admissions was slightly lower for HCC casual users compared with HCC major and nonusers (**Table 2a**); however, there were no statistically significant differences across the 3 groups.

### Standardized Claim Costs for Employees

HCC casual user spending was \$482 higher than that of HCC major users ( $P < .01$ ), with most of the difference (\$263) attributable to increased pharmaceutical expenses. Costs associated with HCC major users were statistically lower than both other groups for preventive care ( $P < .001$ ) and lower than HCC casual users for acute/chronic care ( $P < .05$ ). Pharmaceutical costs were significantly higher in both the HCC

■ **Table 1.** Sample Characteristics, January 1, 2006, to December 31, 2008

Variables	Employees			Dependents			TOTAL
	HCC Major Users	HCC Casual Users	HCC Nonusers	HCC Major Users	HCC Casual Users	HCC Nonusers	Total
	N = 2672	N = 1318	N = 734	N = 2642	N = 2381	N = 3109	
	% or mean (SD)	% or mean (SD)	% or mean (SD)	% or mean (SD)	% or mean (SD)	% or mean (SD)	Total
<b>Demographic Characteristics</b>							
Age (retirees excluded)							
Age, years (mean)	44.6 (8.1)	45.8 (9.5) ***	45.3 (9.0)	276 (177)	19.8 (17.6) ***	21.3 (18.5) ***	31.07 (12.3)
Age category, years		***	**		***	***	
Under 18	–	–	–	55.7%	62.3%	41.9%	33.6%
18-44	49.7%	44.8%	48.5%	25.9%	22.5%	34.0%	58.2%
45 and over	50.3%	55.2%	51.5%	18.5%	15.2%	24.1%	31.3%
Female	50.8%	44.5% ***	28.3% ***	52.0%	51.4%	55.2% *	50.3%
Race							
White	85.3%	84.8%	83.0%	86.8%	86.9%	88.0%	86.4%
Black	6.4%	7.4%	4.1%	4.4%	4.2%	4.1%	5.1%
Asian	7.1%	5.9%	10.6%	6.5%	7.3%	10.6%	7.2%
Other	1.2%	1.9%	2.3%	1.0%	1.5%	2.3%	1.4%
<b>Other Characteristics</b>							
Duration of SAS employment (years)	12.1 (6.5)	8.9 (6.8) ***	5.4 (4.2) ***	12.1 (6.5)	10.5 (6.8) ***	6.9 (5.3) ***	10.1 (6.4)
Job class							
Management/professional	83.5%	81.4%	76.7%	85.4%	87.1%	82.1%	83.5%
Sales/office	4.8%	7.7%	1.1%	4.9%	4.7%	3.4%	4.8%
Other	11.7%	10.9%	22.2%	9.7%	8.2%	14.5%	11.7%
Income quintile							
Lowest	16.7%	18.4%	6.8%	8.1%	12.0%	13.5%	12.7%
Highest	18.9%	23.1%	38.9%	34.3%	23.0%	22.6%	25.7%
Number of dependents	1.8 (1.4)	1.7 (1.4) *	1.8 (1.4)	–	–	–	1.8 (1.4)
<b>Health Status</b>							
Chronic diseases*							
Hypertension	15.0%	16.5%	17.9%	11.8%	11.5%	12.9%	14.2%
Heart disease	1.4%	1.4%	2.5%	1.8%	1.4%	1.4%	1.6%
Type 1 or 2 diabetes mellitus	3.7%	5.2% *	6.5% **	3.3%	3.1%	3.8% *	4.1%
Asthma	5.8%	4.6%	5.0%	5.4%	6.1%	5.7%	5.6%
Stroke	0.3%	1.0% **	0.4%	0.3%	0.2%	0.4%	0.4%
Total chronic diseases (exclude <18)	0.26 (0.55)	0.29 (0.59)	0.32 (0.63) ***	0.23 (0.53)	0.19 (0.46) *	0.20 (0.50)	0.26 (0.57)
Present with ≥1 of 5 diseases above	21.5%	22.8%	24.9% *	14.1%	11.1% **	11.2% **	15.9
HCC indicates Health Care Center. * indicates significant at .05 level (2-tailed test). ** indicates significant at .01 level (2-tailed test). *** indicates significant at .001 level (2-tailed test). *Anyone with at least 2 claims in the study period with a corresponding diagnosis code.							

**Table 2a.** Employee Average Annual Utilization and Monetized Claim Cost, January 1, 2006, to December 31, 2008

Variables	Unadjusted Means (SE) / %			Adjusted Means (SE) <sup>a</sup>		
	HCC Major Users	HCC Casual Users	HCC Nonusers	HCC Major Users	HCC Casual Users	HCC Nonusers
Health Services Use						
Outpatient encounters						
External encounters	13.7 (0.2)	16.3 (0.3)	13.3 (0.4)	11.3 (0.5)	14.0 (0.5) ***	12.5 (0.6) ***
Preventive encounters	0.02 (0.003)	0.11 (0.01)	0.12 (0.01)	0.03 (0.01)	0.12 (0.01) ***	0.13 (0.01) ***
Acute/chronic encounters	13.6 (0.2)	16.2 (0.3)	13.2 (0.4)	11.3 (0.5)	13.9 (0.5) ***	12.3 (0.6) ***
HCC encounters	7.9 (0.1)	2.24 (0.09)	0	7.9 (0.2)	2.4 (0.2) ***	– ***
Preventive claim encounters	0.32 (0.01)	0.07 (0.01)	0	0.36 (0.03)	0.10 (0.03) ***	– ***
Acute/chronic claim encounters	7.5 (0.09)	2.17 (0.08)	0	7.5 (0.2)	2.3 (0.2) ***	– ***
Probability of any medical use	91.8%	96.6%	97.8%	–	–	–
Probability of any hospital admission	4.1%	3.3%	4.1%	–	–	–
Hospital admissions	0.06 (0.004)	0.04 (0.005)	0.06 (0.009)	0.06 (0.01)	.04 (.01)	0.06 (0.01)
Hospital days per 1000	0.18 (0.02)	0.17 (0.03)	0.19 (0.03)	0.27 (0.04)	.26 (.04)	0.28 (0.05)
Standardized Claim Costs						
Inpatient expenses	380 (35)	357 (57)	208 (34)	430 (81)	386 (88)	238 (102) *
Labor and delivery expenses	122 (10)	117 (18)	119 (30)	83 (25)	64 (28)	43 (37)
ED expenses	83 (5)	99 (9)	110 (12)	121 (13)	129 (14)	138 (16)
Pharmaceutical expenses	1241 (32)	1527 (55)	966 (61)	837 (73)	1100 (78) ***	593 (91) **
Ambulatory expenses	2487 (60)	2834 (116)	2546 (140)	2261 (154)	2517 (166) *	2428 (192)
Preventive care	3 (0.3)	15 (0.9)	16 (1)	3 (1.0)	15 (1.1) ***	16 (1.3) ***
Acute/chronic care	2484 (60)	2819 (116)	2530 (140)	2261 (154)	2517 (166) *	2428 (192)

ED indicates emergency department; HCC, Health Care Center.  
 \* indicates significant at .05 level (2-tailed test); \*\* indicates significant at .01 level (2-tailed test); \*\*\* indicates significant at .001 level (2-tailed test).  
<sup>a</sup>All models adjust for age, gender, race, duration of SAS employment, job class, income quintile, number of dependents, number of chronic diseases.

casual-user group ( $P < .001$ ) and HCC major user group ( $P < .01$ ) relative to the non-user group. Employee HCC major users had significantly lower claims costs related to preventive care than did both comparison groups ( $P < .001$ ).

### Health Services Use by Dependents

In adjusted analyses, for dependents, lower encounter rates for HCC major users were observed for all outpatient use relative to the HCC casual users ( $P < .001$ ) (Table 2b); and HCC nonusers ( $P < .001$ ). This pattern and level of significance held true for both preventive and acute care encounters. Hospital admissions were significantly higher for dependent nonusers compared with major users

( $P = .003$ ). Otherwise, dependents mirrored patterns seen in employee utilization. There was no difference across groups in hospital days per 1000.

### Standardized Claim Costs for Dependents

Dependents in the HCC major user group had claim costs that were approximately \$600 lower than those in the HCC casual user group and \$330 lower than those in the HCC nonusers ( $P < .001$  and  $P < .01$ , respectively). Outpatient health claim costs accounted for most of the difference. As they were for employee HCC major user, outpatient costs were lowest for dependent HCC major users, which were significantly different from those of

**Table 2b.** Dependent Average Annual Utilization and Monetized Claim Cost, January 1, 2006, to December 31, 2008

Variables	Unadjusted Means (SE) / %			Adjusted Means (SE) <sup>a</sup>		
	HCC Major Users	HCC Casual Users	HCC Nonusers	HCC Major Users	HCC Casual Users	HCC Nonusers
Health Services Use						
Outpatient encounters						
External encounters	7.8 (0.2)	10.5 (0.2)	9.8 (0.2)	6.3 (0.3)	9.8 (0.3) ***	8.2 (0.3) ***
Preventive encounters	0.03 (0.002)	0.18 (0.01)	0.23 (0.01)	0.05 (0.01)	0.16 (0.01) ***	0.21 (0.01) ***
Acute/chronic encounters	7.8 (0.2)	10.4 (0.2)	9.6 (0.2)	6.3 (0.3)	9.6 (0.3) ***	8.0 (0.3) ***
HCC encounters						
Preventive claim encounters	4.74 (0.06)	0.73 (0.02)	0	4.56 (0.08)	0.68 (0.08) ***	– ***
Acute/chronic claim encounters	0.18 (0.01)	0.01 (0.001)	0	0.16 (0.01)	0 ***	– ***
Probability of any medical use	4.56 (0.06)	0.73 (0.02)	0	4.4 (0.08)	0.69 (0.08) ***	– ***
Probability of any hospital admission	94.6%	91.6%	83.8%	–	–	–
Hospital admissions	2.7%	3.2%	4.6%	–	–	–
Hospital days per 1000	0.04 (0.004)	0.04 (0.004)	0.06 (0.004)	0.04 (0.01)	0.04 (0.01)	0.05 (0.01) **
Standardized Claim Costs	0.16 (0.02)	0.18 (0.05)	0.29 (0.08)	0.14 (0.12)	0.15 (0.12)	0.26 (0.12)
Standardized Claim Costs						
Inpatient expenses	2301 (56)	2464 (77)	2398 (62)	1755 (133)	2353 (134) ***	2085 (130) **
Labor and delivery expenses	212 (24)	212 (30)	266 (3)	134 (59)	172 (60)	228 (58) *
ED expenses	102 (12)	131 (18)	139 (19)	62 (34)	76 (36)	66 (34)
Pharmaceutical expenses	101 (6)	97 (6)	105 (5)	106 (12)	104 (12)	105 (12)
Ambulatory expenses	671 (24)	555 (23)	424 (16)	321 (43)	376 (43)	238 (42) *
Preventive care	1317 (33)	1601 (51)	1603 (38)	1195 (83)	1702 (84) ***	1514 (81) ***
Acute/chronic care	3 (0.2)	17 (0.6)	24 (0.7)	4 (1)	16 (1) ***	21 (1) ***
	1314 (33)	1583 (51)	1579 (38)	1191 (83)	1687 (84) ***	1493 (81) ***

\* indicates significant at .05 level (2-tailed test); \*\* indicates significant at .01 level (2-tailed test); \*\*\* indicates significant at .001 level (2-tailed test).  
<sup>a</sup>All models adjust for age, gender, race, duration of SAS employment, job class, income quintile, number of dependents, number of chronic diseases. ED indicates emergency department; HCC, Health Care Center.

HCC casual users ( $P < .001$ ) and HCC nonusers ( $P < .001$ ). Pharmaceutical expenses were significantly lower for dependent nonusers relative to major users ( $P = .02$ ). As they were for employee HCC major users, preventive care claims costs were lower for dependent HCC major users relative to both comparison groups ( $P < .001$ )—a finding repeated for acute care claims ( $P < .001$ ).

## DISCUSSION

Both employee and dependent casual users of the SAS Health Care Center had higher annualized claims costs than HCC major and nonusers. This finding was likely driven by

high pharmaceutical expenses in HCC casual user employees and by acute and chronic care encounters in dependents. Employee and dependent HCC major users had significantly lower claims costs than the other groups for outpatient claims, including those related to preventive care services.

Health services use by employee and dependent HCC major users was significantly lower than comparison groups for external encounters ( $P < .001$ ), and as expected, significantly higher than comparison groups for HCC encounters ( $P < .001$ ). HCC casual users, both employees and dependents, had the highest number of external encounters—accounted for principally by more preventive encounters—compared with employees and dependents

in other groups. Dependent HCC major users showed significantly fewer hospital admissions compared with nonusers, but this result was not found in employees.

Others have also found lower use of health services outside the workplace when there is a clinic available on site. Turner found that primary care costs for patients seeking care from a worksite medical home were 42% lower than for patients seeking care from community providers.<sup>7</sup> Furthermore, in a cost-effectiveness study for another North Carolina employer, Syngenta's worksite clinic was found to provide its employee healthcare services 66% less expensively than it would have cost to provide similar healthcare services off-site.<sup>18</sup>

An important limitation of comparing only actual health services use and health plan claims costs to demonstrate differences between the groups is that it accounts only for "hard return on investment (ROI)" (savings in direct health plan costs), and ignores both the cost of running the on-site clinic and "soft ROI" (which includes productivity gains accrued through less time away from work for provider visits, fewer sick days, company loyalty, increased employee satisfaction, and lower turnover).

Examples of companies that have experienced soft ROI include Southwire, Mead Corporation, and SAS Institute—all of which experienced cost savings (inclusive of some soft ROI) when providing on-site healthcare to employees in their larger locations.<sup>16,19</sup> Others have investigated productivity gains: Syngenta, for example, found that the on-site health clinic averted the loss of 3028 work hours (for 725 employees) in 1 year.<sup>18</sup> This 4 hours per year per employee would translate into savings of \$50 to \$300 depending on employee salary. SAS estimates a minimum of 2 hours of work time saved with each employee visit and includes that savings in its ROI calculation. Similarly, Pachman et al found that an on-site corporate medical clinic reduced absenteeism by 3.3 days per employee per year, which again could translate into hundreds of dollars depending on the employee's compensation.<sup>20</sup> They also investigated whether the availability of on-site healthcare encouraged "frivolous" use, and found that for all the healthcare visits provided on-site, 69% of employees reported that they would have sought care elsewhere.

### Limitations and Strengths

Our study has several important limitations. First, we examined only costs associated with the health plan use, not costs incurred by SAS in its operation of the HCC. The use of health services shows that HCC users to a large extent receive their services from the HCC instead of from the outside, although there is not a full substitution. We did not

attempt to assess the total costs to SAS of external services covered by the health plan and the costs of the services provided through the HCC. Second, we have not included any indirect benefits (such as productivity gains, employee satisfaction, and company image) associated with the SAS HCC. This study examined only a single employer in 1 location, albeit a large employer. Analyses were adjusted by group; however, employees may self-select for themselves and their dependents based on factors (such as preexisting conditions and lifestyle behaviors) for which we were not able to control. Finally, the employee population consists largely of professional/managerial positions.

The study also has considerable strengths. First, it examines well-documented outcomes from a large number of employees and dependents who received comprehensive coverage over the course of several years. Our analysis adjusted for many potential confounders. Finally, the evaluation team was strengthened by the inclusion of both internal and external team members.

These analyses provide comparative results that may be of interest to SAS and other employers, and they also represent analyses that may be possible to conduct for other employers with relative ease. The evaluation also illustrates the use of integrated SAS Analytics, SAS's own data management and analysis package, which facilitated the analysis of this relatively complex database.

## CONCLUSIONS

In summary, in this evaluation of a medical home embedded in a large workplace, health plan claims costs were higher for casual users of the HCC than for the other 2 comparison groups. Employee and dependent HCC major users had significantly lower claims costs than the other groups for outpatient claims, including those related to preventive care services. Dependent HCC major users had significantly fewer hospital admissions than nonusers—a finding not replicated in employees. Additional research is needed to assess the extent and cost of the medical home's utilization that may substitute for costs incurred by the health plan. We also concur with a recent review of the worksite medical home literature that further research should explore the extent to which the employees' greater utilization of preventive and acute care services at an on-site primary care medical home affects employee health outcomes in the short and long term.<sup>21</sup>

**Author Affiliations:** Center for Health Policy and Inequities Research (CC), Duke University, Durham, NC; Department of Community and Family Medicine (RNB, TØ), Duke University, Durham, NC; SAS Institute Inc (GA, DO, JS), Cary, NC.

**Source of Funding:** SAS Institute Inc.

**Author Disclosures:** Drs Conover and Østbye and Ms Namenek Brouwer were contracted by SAS to evaluate on-site health center and have received/pending grants. Dr Olaleye, Ms Adcock, and Mr Shipway are employees of SAS Institute.

**Authorship Information:** Concept and design (RNB, CC, TØ, JS, GA); acquisition of data (JS); analysis and interpretation of data (RNB, CC, TØ, DO, JS); drafting of the manuscript (RNB, CC, TØ, DO, GA); critical revision of the manuscript for important intellectual content (RNB, CC, DO, GA); statistical analysis (TØ, DO, JS); provision of patients or study materials (GA); obtaining funding (CC, GA); and supervision (CC, TØ).

**Address correspondence to:** Rebecca Namenek Brouwer, MS, Associate Director of Research Operations, Duke University, DUMC Box 2713, Durham, NC 27710. E-mail: rebecca.brouwer@duke.edu.

## REFERENCES

- World health statistics 2013 [Health Expenditure]. World Health Organization website. [http://apps.who.int/iris/bitstream/10665/81965/1/9789241564588\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/81965/1/9789241564588_eng.pdf?ua=1). Published 2013. Accessed January 22, 2014.
- National health expenditures 2010: sponsor highlights. CMS website. <https://www.cms.gov/NationalHealthExpendData/downloads/sponsors.pdf>. Published September 2011. Accessed January 22, 2014.
- Bindman AB, Grumbach K, Osmond D, et al. Preventable hospitalizations and access to health care. *JAMA*. 1995;274(4):305-311.
- Franks P, Fiscella K. Primary care physicians and specialists as personal physicians. health care expenditures and mortality experience. *J Fam Pract*. 1998;47(2):105-109.
- Bindman AB, Grumbach K, Osmond D, Vranizan K, Stewart AL. Primary care and receipt of preventive services. *J Gen Intern Med*. 1996;11(5):269-276.
- Mark DH, Gottlieb MS, Zellner BB, Chetty VK, Midtling JE. Medicare costs in urban areas and the supply of primary care physicians. *J Fam Pract*. 1996;43(1):33-39.
- Turner DE. Worksite primary care: an assessment of cost and quality outcome metrics. *J Occup Environ Med*. 2010;52(6):573-575.
- Friedberg MW, Schneider EC, Rosenthal MB, Volpp KG, Werner RM. Association between participation in a multipayer medical home intervention and changes in quality, utilization, and costs of care. *JAMA*. 2014;311(8):815-825.
- Starfield B, Shi L. The medical home, access to care, and insurance: a review of evidence. *Pediatrics*. 2004;113(5 suppl):1493-1498.
- Barr M; American College of Physicians. *The Advanced Medical Home: A Patient-Centered, Physician-Guided Model of Health Care*. Philadelphia, PA: American College of Physicians; 2006.
- Sia C, Tonniges TF, Osterhus E, Taba S. History of the medical home concept. *Pediatrics*. 2004;113(5 suppl):1473-1478.
- Martin JC, Avant RF, Bowman MA, et al; Future of Family Medicine Project Leadership Committee. The Future of Family Medicine: a collaborative project of the family medicine community. *Ann Fam Med*. 2004;2(suppl 1):S3-S32.
- Health care where you work [editorial]. *The New York Times*. September 2, 2012:A18.
- Mercer Consulting. In a tough year, employers hold the line on health benefit cost increases. [http://www.businesswire.com/news/home/20091120005051/en/Tough-Year-Employers-Hold-Line-Health-Benefit#.Ut\\_4O2Qo5hA](http://www.businesswire.com/news/home/20091120005051/en/Tough-Year-Employers-Hold-Line-Health-Benefit#.Ut_4O2Qo5hA). Published November 20, 2009. Accessed January 22, 2014.
- Dunning M. Worksite health, medical clinics gaining ground with employers: Mercer. Modern Healthcare website. <http://www.modern-healthcare.com/article/20130312/INFO/303129985>. Published March 12, 2013. Accessed January 10, 2014.
- Gemignani J. Bringing the doctor to the (company) door. *Bus Health*. 1998;16(5):24-26,36.
- Berry LL, Mirabito AM. Partnering for prevention with workplace health promotion programs. *Mayo Clin Proc*. 2011;86(4):335-337.
- Chenowith DH, Garrett J. Cost-effectiveness analysis of a worksite clinic: is it worth the cost? *AAOHN J*. 2006;54(2):84-89; quiz 90-91.
- Adcock G. Creating a healthy workforce: model of a successful on-site health clinic. Paper presented at: Carolinas Healthcare System 2005; Charlotte, NC.
- Pachman JS, Stempien DE, Miles SS, O'Neill FN. The hidden savings of an on-site corporate medical center. *J Occup Environ Med*. 1996;38(10):1047-1048.
- Shahly V, Kessler RC, Duncan I. Worksite primary care clinics: a systematic review. *Popul Health Manag*. 2014;17(5):306-315. ■

[www.ajmc.com](http://www.ajmc.com) Full text and PDF