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The Relationship Between the Use of a Worksite Medical Home and ED Visits or Hospitalizations

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Abstract

Worksite medical homes may be a good model for improving employee health. The aim of this study was to compare the likelihood of being seen in the emergency department (ED) or being hospitalized by level of use (no use, occasional use, or primary care) of a worksite medical home, overall and by type of user (employee, adult dependent, or pediatric dependent). This was a retrospective analysis of claims data, using covariate-adjusted logistic regression models for ED visits and inpatient hospitalizations. Secondary data for the years 2006 to 2008 from a company that offers an on-site health care center (HCC) were used. Analyses were based on a data set that combines health plan claims and human resources demographic data. Overall, people who did not use the HCC were more likely to be seen in the ED (adjusted odds ratio [OR] = 1.20, 95% confidence interval or CI [1.06, 1.37], $P = .005$) or to be hospitalized (adjusted OR = 1.58; 95% CI [1.34, 1.86]; $P < .0001$) compared with those who used the HCC for primary care. Both ED visits and hospitalizations for employees and dependents in this study were lower among those who used the worksite medical home for primary care. Worksite medical homes can improve chronic disease management and thus reduce ED visits and hospitalizations. These findings contribute to growing evidence that worksite medical homes are potentially cost-effective.

Keywords

medical home, health care utilization, health care cost

Background

Worksite medical homes can be a good model for improving the health of employees and their dependents through readily accessible high-quality health care.[1-4] The term *worksite medical home* is used here to denote worksite comprehensive primary care that offers acute care and chronic disease management in addition to clinical preventive services that are provided by nurse practitioners and physicians. Such clinics are gaining popularity. In 2014, the number of companies that employed 5000 or more people and offered worksite clinics that provide primary care services was 29%, up from 24% in 2013.[5] Studies on the costs and return on investment of these clinics[6-10] and studies on patient satisfaction[3] suggest that worksite medical homes can offer benefits to both employers and employees.

Employers' primary reasons for providing a worksite medical home to employees are to reduce absenteeism, reduce overall health care costs, and improve management of employee health risks and chronic conditions.[11,12] One way to reduce health care costs is to reduce emergency department (ED) visits and hospitalizations. One study concluded that 56% of visits to the ED by members of a group that had employer-provided health benefits could have been handled outside of the ED.[13] Pilot studies of medical homes (not necessarily worksite based) have demonstrated cost savings through reductions in ED visits and hospitalizations for ambulatory care sensitive conditions (ACSCs) due to improved management of these conditions.[14] ACSCs represent potentially avoidable hospitalizations or ED visits and are widely used as an indicator for access to effective health care.[15]

Due to the relative newness of the worksite medical home paradigm, data on its utilization and on health outcomes for employees who receive their primary care from one of these clinics are still limited.[12,16] A recent study found that employees who had access to a worksite clinic that provided episodic

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care had fewer ED visits than those who did not have access to such a clinic.[17] Although that study was limited to the evaluation of a clinic that offered only episodic or acute care, it suggests that any worksite clinic where employees can obtain primary care services could reduce the use of the ED. However, that study did not look at the actual utilization of the clinic; it looked only at whether the clinic could be accessed.

The first objective of these analyses was to assess the utilization of the ED and inpatient hospital admissions for employees (and their dependents) whose company offers a worksite medical home that provides both primary care and acute care services. Second, we wanted to compare the likelihood of being seen in the ED or being hospitalized by level of use (no use, occasional use, or primary care) of a worksite medical home, both overall and by type of member (employee, adult dependent, or pediatric dependent). In addition, we examined ED visits and hospitalizations specifically for members who were identified as having an ACSC, again by the level of use of the worksite medical home.

Methods

Design

This was a retrospective study that compared the likelihood of being seen in the ED or being hospitalized by the level of health care center (HCC) use and by member type.

SAS (formally called SAS Institute Inc.) is the world's largest privately held software company and has more than 13 660 employees. Approximately 5361 employees work at the company's global headquarters in Cary, North Carolina, which has had an on-site HCC since 1984. In 1996, the HCC added staff to make primary care available and has since then served as a worksite medical home for employees and their dependents covered by the SAS medical plan. The HCC operates during company weekday business hours and offers after-hours care through an answering service and rotating on-call staff physicians and nurse practitioners. Nurse practitioners, physicians, and other health professionals provide a full range of primary care services. The HCC interdisciplinary team of physicians, nurse practitioners, nurses, nutritionists, physical therapists, and psychologists provide comprehensive coordinated primary care to more than 13 000 patients, from infants to elders. Use of an electronic health record in conjunction with referral software allows information to be shared across providers to ensure completion of specialty referrals and diagnostic and screening tests for the appropriate follow-up of chronic and acute conditions. The HCC has 24/7 primary care responsibility for all employees and dependents who choose the HCC as their primary provider. During this study's timeframe, employees could choose between a networked preferred provider organization (PPO) plan and an indemnity plan for their own and their dependents' company-sponsored medical plan. The health insurance plan design was the same in the PPO and in the indemnity plan, and there was limited prior authorization required for employees or dependents. They could also choose between the on-site HCC and a community provider for primary care.

Employees and family members voluntarily choose the HCC as their primary care provider (PCP), and 75% of employees and 50% of dependents do so. Employees and dependents may opt in/out of PCP status at any time while they are covered by the SAS medical plan (there is no formal or limited enrollment period). There are several incentives to choose the HCC: no co-pays or coinsurance—all services are free; the HCC is conveniently located on the SAS campus; there are appointments available during extended hours before and after the standard SAS work day; the quality of care is rated highly by HCC users on customer service surveys. The HCC does not serve a gatekeeping function. All individuals covered by the SAS medical plan are free to see specialists without a referring provider, HCC or community based.

The study population included in these analyses consisted of all employees who were eligible for benefits and were employed for the entire 3-year study period, regardless of whether they had any claims in the time period or not, in addition to their dependents (adult and pediatric). The three mutually exclusive groups were (1) *HCC primary care users* who had designated the HCC as their PCP, (2) *HCC occasional users* who had designated PCPs outside of the HCC but used other HCC services at least once during the 3-year study period, and (3) *HCC non-users* who had not designated HCC as their PCP and also did not use the HCC at all during the study period. Any employee or dependent who changed groups in the 3-year period (eg, from a primary care user to non-user) was excluded from the analysis. (The proportion of patients who changed groups was small, and analyses that included them had no appreciable effect on the study results.) The study was reviewed and approved by the Duke University Medical Center Institutional Review Board.

Data and Measures

The analyses were based on actual medical plan claims for employees and dependents that were paid by SAS during the period from January 1, 2006, to December 31, 2008. For the current analyses, data from SAS Human Resources databases (for demographics, type of position, and so on) and medical plan claims databases were linked and merged by SAS personnel. To protect confidentiality, random identification numbers were assigned to each plan member and the data set was de-identified prior to analysis. Income for SAS employees was only available as a quintile level, ranging from the first quintile (lowest) to the fifth (highest). The demographic information related to position or income level for employees was also used for their dependents, because this information was not available for family members. Race was categorized as white, black, Asian, or other. Age was

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categorized into six groups: birth to 4 years, 5 to 17 years, 18 to 30 years, 31 to 45 years, 46 to 60 years, and 61 years or older. Comorbidities were coded by considering the presence, or absence, of five chronic diseases that were identified in the claims data (hypertension, heart disease, Type 2 diabetes mellitus, asthma, and stroke) and then totaling the number of these chronic diseases. The total possible number of comorbidities thus ranged from 0 to 5.

ED visits and hospitalizations were identified based on the place-of-service code in the claims data. Visits to the ED were coded as 23 for the place of service, and inpatient admissions were coded as 21. Disease burden was assessed using the Charlson Comorbidity Index (CCI).[18] Unlike other comorbidity measures that are primarily developed for use with inpatient claims data, the CCI has been adapted to predict the costs of chronic disease burden in primary care settings.[19,20] ACSCs were also identified in the claims data by using the Agency for Healthcare Research and Quality (AHRQ) Prevention Quality Indicators (PQIs) measurement guidelines and modified program version 4.5.[21] These indicators were slightly adapted to reflect that we were using claims data rather than hospital discharge abstract data. ACSCs are different for adult and pediatric populations; therefore, we split the dependents into adult dependents (aged 18 and older) and pediatric dependents (below the age of 18) rather than combining these two age groups.

Analysis

Sample characteristics were calculated as percentages and counts, or means and standard deviations, both for each member type and by HCC use level. Separate covariate-adjusted logistic regression models for ED visits and inpatient hospitalizations were built. These models were run for the overall population and then for each of the three member types separately. Covariates included in the models were demographic characteristics (age category, gender, and race), employee characteristics (job classification and income quintile), and the total number of comorbidities to control for baseline differences between the groups. We ran some preliminary analyses to assess potential yearly effects; no significant year effects were found for any of the groups, so we did not control for year in any subsequent models.

Finally, the same models were run once by CCI category, and another model was restricted to only those with at least one ACSC within the 3-year study period.

Results

The sample consisted of 3759 employees, 2982 adult dependents, and 3520 pediatric dependents (ages 0-17). In the employee sample, 63.9% used the HCC for primary care, 24.9% occasionally used the HCC, and 11.1% did not use the HCC at all during the 3-year period. For adult and pediatric dependents, respectively, the numbers were 46.8% and 28.8% for primary care use, 24.0% and 36.3% for occasional use, and 29.2% and 34.9% for no use. The number of individuals in each group who were seen in the ED (one or more times) during the study period differed by group: Only 17.7% of employees were seen in the emergency room (ER), whereas 20.4% of adult dependents and 22.5% of pediatric dependents were seen there. Inpatient hospitalizations were less common during the study period: 11.0% of employees, 12.1% of adult dependents, and 13.2% of pediatric dependents were admitted to the hospital. See the appendix for a comparison of the characteristics of the workplace by HCC use level and Table 1 for sample characteristics and descriptive statistics.

Across all types of study participants, the proportion who had any ED visit was higher for non-users than for occasional or for primary care users. However, the proportion of cumulative ED visits was higher for employees and adult dependents who used the HCC for primary care than for non-users: 247 visits per thousand members for employee primary care users versus 301 for employee non-users ($P = .02$) and 322 per thousand for adult dependent users versus 341 for adult dependent non-users ($P = .36$).

The proportion of individuals seen in the ED at least once during the study period increased as the level of HCC use decreased for all member types. For employees, 16.7% of the HCC primary care users had an ED visit; the proportion increased to 18.8% and 20.8% for occasional and non-users, respectively ($\chi^2 = 1.32$ and $P = .08$). The proportion of those who were hospitalized was also lower for HCC primary care employees (11.4%) than for non-users (12.2%), but occasional users had the lowest proportion of hospitalizations (9.6%; $\chi^2 = 2.77$ and $P = .25$). The patterns were the same for ED visits for both adult dependents ($\chi^2 = 1.32$ and $P = .52$) and pediatric dependents ($\chi^2 = 3.51$ and $P = .17$). We observed significant differences in hospitalizations, with the lowest percentages in the primary care groups (10.8% for adult dependents and 5.8% for pediatric dependents) and the highest in the non-user groups (14.2% and 21.3%, respectively). For adult dependents, $\chi^2 = 6.13$ and $P = .05$; for pediatric dependents, $\chi^2 = 122.51$ and $P < .001$. See Table 2 for details.

As expected, ED visits and hospitalizations for the group who had ACSCs were higher than in the overall population (employees and dependents combined), but the percentages by the level of HCC use were not as they were hypothesized for the employees. Whereas 27.4% of employee primary care users who had an ACSC were seen in the ER, the number was slightly less for non-users (26.9%). This was not the case for both types of dependents, where the percentage of those who had an ED visit was higher for non-users than it was for primary care users. For all member types who had an ACSC, a higher percentage of non-users group were hospitalized than primary care users. Table 2 presents the percentages of ED visits, hospitalizations, and ACSCs for all member types and for those who had an ACSC.

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Table 1. Subject Characteristics.

	Employees (n = 3759)		Adult dependents (≥18; n = 2982)		Pediatric dependents (<18; n = 3520)	
Variable	%	n	%	n	%	n
Sex						
Female	46.6	1751	57.8	1724	47.9	1687
Male	53.4	2008	42.2	1258	52.1	1833
Race						
White	85.0	3197	87.0	2594	86.5	3045
Black	6.3	235	4.3	127	4.5	159
Asian	7.3	275	7.4	221	8.1	284
Other	1.4	52	1.3	40	0.9	32
Age: Mean (SD)	45.5	8.2	40.2	12.9	8.7	5.1
Age categories						
≤4	—	—	—	—	24.3	854
5-17	—	—	—	—	75.7	2666
18-30	3.2	120	22.9	683	—	—
31-45	47.9	1799	39.7	1184	—	—
46-60	45.1	1697	33.1	988	—	—
≥61	3.8	143	4.3	127	—	—
Mean age (SD)						
Job category (of employee)						
Management, professional, and related	84.4	3174	85.3	2544	88.5	3114
Sales and office	10.1	379	9.7	290	7.5	265
Other	5.5	206	5.0	148	4.0	141
Income (of employee in quintiles)						
1 (lowest)	14.1	531	11.5	342	8.7	306
2	18.3	688	16.2	484	16.3	574
3	21.1	795	20.4	607	22.2	780
4	23.0	864	23.9	714	26.7	941
5	23.4	880	27.9	832	26.1	918
Number of cases						
Had any ACSC	20.3	762	19.5	581	11.1	389
Health care center use level						
No use	11.1	419	29.2	871	34.9	1230
Occasional	24.9	937	24.0	716	36.3	1278
Primary care	63.9	2403	46.8	1395	28.8	1012
Admission characteristics						
Any ED visit (during study period)	17.7	664	20.4	609	22.5	793
Total number of ED visits	—	983	—	988	—	1133
Annualized rate of ER visits[a]	87.2	—	331.3	—	321.9	—
Any inpatient hospitalization	11.0	414	12.1	360	13.2	465
Total number of inpatient hospitalizations	—	1336	—	1243	—	1469
Annualized rate of hospitalizations[a]	118.5	—	416.8	—	417.3	—

Note. ACSC = ambulatory care sensitive condition; ED = emergency department; ER = emergency room.
[a]Per thousand.

Table 3 presents the odds ratios (ORs) and 95% confidence intervals (CIs) from the adjusted logistic regression models of the determinants of having any ED visit during the study period. Non-users of the HCC had significantly higher odds of being seen in the ED than primary care users for the overall population (OR = 1.20 and 95% CI [1.06, 1.37], a 3% reduction in ED visits) and for employees specifically (OR = 1.43 and 95% CI [1.09, 1.87], a 6% reduction in ED visits). There was no significant association between the level of HCC use and ED visits for adult or pediatric dependents.

Table 4 similarly presents the ORs and 95% CIs from the adjusted logistic regression models of the determinants of

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Table 2. ED Visits and Hospitalizations Overall (2006-2008) for Total Population, by the Level of Comorbidity, and for Those With ACSCs.

	Employees (n = 3759)			Adult dependents (n = 2982)			Pediatric dependents (n = 3520)		
HCC use level	Primary care	Occasional	None	Primary care	Occasional	None	Primary care	Occasional	None
No. of members	2403	937	419	1395	716	871	1012	1278	1230
Of the total population									
% (n) with an ED visit	16.7 (401)	18.8 (176)	20.8 (87)	19.7 (275)	20.3 (145)	21.7 (189)	20.6 (208)	22.8 (292)	23.8 (293)
% (n) hospitalized	11.4 (273)	9.6 (90)	12.2 (51)	10.8 (150)	12.0 (86)	14.2 (124)	5.8 (59)	11.3 (144)	21.3 (262)
% (n) with an ACSC	18.8 (452)	22 (206)	24.8 (104)	16.9 (236)	18.7 (134)	24.2 (211)	9.8 (99)	12.6 (161)	10.5 (129)
% (n) with an CCI of 0	88 (2,115)	88 (825)	84 (354)	91 (1,270)	91 (652)	90 (785)	94 (947)	93 (1189)	95 (1165)
% (n) with an CCI of 1	10 (247)	10 (92)	13 (56)	8 (109)	8 (59)	8 (73)	6 (64)	7 (89)	5 (64)
% (n) with an CCI of 2+	2 (41)	2 (20)	2 (9)	1 (16)	1 (5)	1 (13)	0 (1)	0 (0)	0 (1)
By CCI score (of those with a CCI score in this category)									
0									
% (n) with an ED visit	15 (326)	17 (144)	20 (70)	19 (235)	18 (118)	19 (153)	20 (190)	22 (257)	23 (264)
% (n) hospitalized	10 (219)	9 (77)	12 (43)	10 (125)	11 (74)	13 (99)	6 (53)	11 (136)	22 (253)
1									
% (n) with an ED visit	25 (61)	29 (27)	29 (16)	29 (32)	41 (24)	37 (27)	28 (18)	39 (35)	44 (28)
% (n) hospitalized	15 (36)	9 (8)	11 (6)	71 (19)	17 (10)	26 (19)	8 (5)	9 (8)	14 (9)
2+									
% (n) with an ED visit	34 (14)	25 (5)	11 (1)	50 (8)	60 (3)	69 (9)	0 (0)	—	100 (1)
% (n) hospitalized	44 (18)	25 (5)	22 (2)	38 (6)	40 (2)	46 (6)	100 (1)	—	0 (0)
Of those with an ACSC									
% (n) with an ED visit	27.4 (124)	29.1 (60)	26.9 (28)	34.3 (81)	35.1 (47)	37.0 (78)	33.3 (33)	29.8 (48)	40.3 (52)
% (n) hospitalized	20.4 (92)	12.6 (26)	21.2 (22)	21.2 (50)	19.4 (26)	25.6 (54)	7.1 (7)	8.7 (14)	18.6 (24)

Note. HCC = health care center; ACSC = ambulatory care sensitive condition; CCI = Charlson Comorbidity Index; ED = emergency department.

having been hospitalized during the study period. In the overall population, there were significantly higher odds of being hospitalized for non-users compared with primary care users (OR = 1.58 and 95% CI [1.34, 1.86], a 6% reduction in admissions). In models for specific member types, the relationship between the level of HCC use and hospitalizations was significant for both adult dependents (OR = 1.44 and 95% CI [1.02, 1.88], a 5% reduction in admissions) and pediatric dependents (OR = 2.00 and 95% CI [1.42, 2.83], a 17% reduction in admissions), but not for employees (OR = 1.38 and 95% CI [0.98, 1.94]).

In the models that were restricted to patients who had an ACSC, there were no significant relationships between the level of HCC use and ED visits (not shown). However, in the overall ACSC population, the results paralleled those of the employees: The non-users had higher odds of being hospitalized compared with primary care users (OR = 1.41 and 95% CI [1.02, 1.96]). No significant association was observed for any of the specific member types. Models for the CCI by category would not converge due to the small number of members in the higher categories (1, 2+).

Discussion

Overall, employees and dependents who did not use the HCC were significantly more likely to be seen in the ED or to be hospitalized compared with those who used the HCC for primary care. When we examined visits to the ED and hospital admissions by member type, we found that employees who never used the HCC were more likely to have an ED visit than HCC primary care users and that both adult and pediatric dependent HCC non-users were more likely to be admitted to the hospital than primary care users.

Our findings are similar to those of Tao et al,[17] who found that employees who have access to a worksite health clinic reduced their use of the ED. We were able to also evaluate the frequency of hospital admissions and the impact of a worksite clinic on the employees' dependents. One notable difference between these studies is that our study was able to evaluate differences in ED utilization and in hospitalizations by the level of use. For most member types, we observed a trend toward higher use of the ED and more hospitalizations as the level of HCC use went down from primary care to occasional use to no use.

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Table 3. The Association Between the Level of Use of Medical Home and Relative Odds of Having Any *ED Visit* in the Study Time Period (2006-2008).

	Everyone		Employees		Adult dependents		Pediatric dependents	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
HCC usage								
Primary care		Reference		Reference		Reference		Reference
Occasional	1.12	[0.99, 1.26]	1.18	[0.7, 1.45]	1.03	[0.82, 1.29]	1.11	[0.90, 1.36]
No use	1.20**	[1.06, 1.37]	1.43**	[1.09, 1.87]	1.12	[0.90, 1.39]	1.12	[0.91, 1.39]
Gender								
Male		Reference		Reference		Reference		Reference
Female	1.03	[0.93, 1.13] For Peer Review	1.29**	[1.07, 1.55]	1.18	[0.97, 1.43]	0.75**	[0.64, 0.88]
Age (years)								
≤4	1.28	[0.92, 1.78]	—	—	—	—	0.79*	[0.64, 0.96]
5-17	1.05	[0.77, 1.41]	—	—	—	—		Reference
18-30	1.13	[0.81, 1.58]	0.70	[0.37, 1.35]	1.11	[0.70, 1.74]	—	—
31-45	0.87	[0.64, 1.17]	0.94	[0.62, 1.50]	0.79	[0.51, 1.23]	—	—
46-60	0.77	[0.57, 1.04]	0.86	[0.56, 1.31]	0.72	[0.46, 1.12]	—	—
≥61		Reference		Reference		Reference	—	—
Race								
White		Reference		Reference		Reference		Reference
Asian and NH/PI	0.77**	[0.63, 0.94]	0.70	[0.48, 1.00]	0.75	[0.51, 1.10]	0.85	[0.62, 1.15]
Black	1.26*	[1.02, 1.56]	1.32	[0.95, 1.83]	1.40	[0.92, 2.12]	1.07	[0.73, 1.57]
Other	0.97	[0.62, 1.52]	1.08	[0.54, 2.19]	1.49	[0.73, 3.04]	0.39	[0.12, 1.29]
Job category (of employee)								
Management, professional, and related		Reference		Reference		Reference		Reference
Sales and office	1.04	[0.86, 1.26]	0.99	[0.72, 1.37]	0.90	[0.63, 1.28]	1.12	[0.81, 1.52]
Other	1.12	[0.85, 1.47]	1.19	[0.77, 1.86]	0.83	[0.50, 1.38]	1.30	[0.80, 2.10]
Income (of employee in quintiles)								
1 (lowest)		Reference		Reference		Reference		Reference
2	0.93	[0.75, 1.15]	0.88	[0.62, 1.26]	0.89	[0.60, 1.33]	1.04	[0.70, 1.54]
3	0.84	[0.67, 1.05]	0.87	[0.60, 1.25]	0.69	(0.45, 1.06]	0.98	[0.66, 1.45]
4	0.93	[0.75, 1.17]	0.88	[0.60, 1.28]	0.79	[0.52, 1.19]	1.16	[0.78, 1.70]
5	0.94	[0.76, 1.17]	0.81	[0.56, 1.18]	0.77	[0.52, 1.16]	1.27	[0.87, 1.87]
Charleston Comorbidity Index								
0		Reference		Reference		Reference		Reference
1	2.06**	[1.76, 2.41]	1.79**	(1.40, 2.29]	2.29**	[1.72, 3.06]	2.15**	[1.61, 2.87]
2+	2.97**	[1.99, 4.44]	1.96*	[1.15, 3.35]	6.15**	3.05, 12.39]	3.83	[0.24, 62-32]

Note. Multivariate logistic regression: ORs and 95% CIs. OR = odds ratio; CI = confidence interval; HCC = health care center. NH/PI = Native Hawaiian or Pacific Islander
*$P \leq .05$. **$P \leq .01$.

We also found that use of the ED and hospitalizations increased for members of the overall population who had ACSCs, as demonstrated by Bindman et al.[15] However, we did not observe a clear trend by the level of HCC use for any of the specific member types. This might be due to limited power, given the relatively small number of people who had ACSCs in our population.

These analyses provide comparative results that might be of interest not only to SAS but also to other employers. The study also represents an example of the type of analyses that other employers might be able to conduct. In addition, the evaluation illustrates the use of integrated SAS® Analytics, SAS's own data management and analysis package, which facilitated the compilation and analysis of these relatively complex data.

Recent changes in the health care system due to the Affordable Care Act may impact the use of worksite medical homes. At this time, it is difficult to predict how these results may be affected, but this is an important topic for future research.

Strengths and Limitations

The strengths of this study include the analysis of well-documented events (ER visits and hospitalizations) from a large

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Table 4. The Association Between the Level of Use of Medical Home and Relative Odds of Having Any *Hospitalization* in the Study Time Period (2006-2008).

	Everyone		Employees		Adult dependents		Pediatric dependents	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
HCC usage								
Primary care	Reference		Reference		Reference		Reference	
Occasional	1.02	[0.86, 1.01]	0.93	[0.72, 1.21]	1.18	[0.88, 1.58]	1.12	[0.78, 1.61]
No use	1.58**	[1.34, 1.86]	1.38	[0.98, 1.94]	1.44**	[1.02, 1.88]	2.00**	[1.42, 2.83]
Gender								
Male	Reference		Reference		Reference		Reference	
Female	1.73**	[1.51, 1.97]	2.38**	[1.88, 3.01]	2.64**	[2.00, 3.46]	0.78*	[0.62, 0.99]
Age (years)								
≤4	4.69**	[3.24, 6.78]	—	—	—	—	0.04**	[0.03, 0.05]
5-17	0.19**	[0.12, 0.28]	—	—	—	—	Reference	
18-30	0.66	[0.44, 1.00]	0.71	[0.33, 1.50]	0.59	[0.33, 1.03]	—	—
31-45	1.00	[0.70, 1.42]	0.95	[0.58, 1.56)	0.95	[0.56, 1.61]	—	—
46-60	0.53**	[0.37, 0.76]	0.57*	[0.34, 0.93]	0.43**	[0.25, 0.75]	—	—
≥61	Reference		Reference		Reference		—	—
Race								
White	Reference		Reference		Reference		Reference	
Asian and NH/PI	1.20	[0.96, 1.51]	1.15	[0.78, 1.70]	1.31	[0.88, 1.96]	1.20	[0.80, 1.78]
Black	0.91	[0.68, 1.22]	1.30	[0.68, 1.57]	0.98	[0.57, 1.70]	0.61	[0.34, 1.10]
Other	1.26	[0.72, 2.19]	1.45	[0.64, 3.30]	1.39	[0.56, 3.44]	0.98	[0.25, 3.81]
Job category (of employee)								
Management, professional, and related	Reference		Reference		Reference		Reference	
Sales and office	0.82	[0.64, 1.05]	0.86	[0.58, 1.25]	0.52*	[0.31, 0.87]	1.00	[0.61, 1.62]
Other	0.75	[0.52, 1.10]	0.71	[0.40, 1.24]	0.48	[0.24, 0.98]	1.15	[0.53, 2.48]
Income (of employee in quintiles)								
1 (lowest)	Reference		Reference		Reference		Reference	
2	0.98	[0.75, 1.29]	0.99	[0.67, 1.48]	0.73	[0.43, 1.24]	1.35	[0.79, 2.32]
3	0.70*	[0.53, 0.93]	0.70	[0.46, 1.09]	0.51*	[0.30, 0.89]	0.94	[0.55, 1.62]
4	0.75*	[0.57, 0.99]	0.65	[0.42, 1.03]	0/60	[0.35, 1.02]	1.03	[0.60, 1.76]
5	0.56**	[0.42, 0.75]	0.62*	[0.40, 0.98]	0.30**	[0.17, 0.52]	1.03	[0.60, 1.78]
Charleston Comorbidity Index								
0	Reference		Reference		Reference		Reference	
1	1.49**	[1.20, 1.85]	1.26	[0.91, 1.75]	2.10**	[1.48, 3.00]	1.01	[0.59, 1.72]
2+	5.71**	[3.76, 8.67]	5.71**	[3.38, 9.66]	6.31**	[3.00, 13.30]	7.17	[0.28, 183.54]

Note. Multivariate logistic regression: ORs and 95% CIs. OR = odds ratio; CI = confidence interval; HCC = health care center.
*$P \leq .05$. **$P \leq .01$.

number of employees and dependents who received comprehensive health plan coverage over the course of several years, and the fact that our analysis adjusted for many potential confounders. In addition, the evaluation was strengthened by the inclusion of both internal and external evaluation team members.

This study has three major limitations: First, in terms of generalizability, we examined only a single (albeit large) employer, whose population consists largely of professionals and managers. Although we had a large sample, it was from a relatively healthy population, so the number of individuals with ACSCs was likely too small to detect any differences between the groups. Second, we did not consider longer term positive health effects or more indirect benefits of worksite medical homes, such as improved employee convenience and satisfaction with the employer as well as positive effects on recruitment and retention of employees. Finally, although analyses were adjusted for common demographic covariates (age, race, and income level) and health covariates (total number of chronic comorbidities), employees could have self-selected the type and level of care for themselves and their dependents based on other factors (such as preexisting conditions and lifestyle behaviors) that we were unable to control for in the analysis.

Conclusion

ER visits and hospitalizations for employees and dependents in this group were lower among those who used the worksite medical home for primary care. These findings contribute to a growing body of evidence about the potential

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cost-effectiveness of worksite medical homes. More research is needed to support these findings, particularly prospective studies on employee health and wellness as they relate to use of worksite clinics and programs.

Worksite medical homes can improve chronic disease management and thus reduce ED visits and hospitalizations. The benefits to employers can be reduced health care costs, improvements in employee wellness and satisfaction, and reduced absenteeism. The degree to which this can happen is important for employers who are considering initial creation of a worksite clinic or program or expansion of existing occupational health clinics to provide primary care services.

Appendix

Worksite Characteristics, January 1, 2006, to December 31, 2008.

	Employees			Dependents			
	HCC major users	HCC casual users	HCC non-users	HCC major users	HCC casual users	HCC non-users	
	N = 2672	N = 1318	N = 734	N = 2642	N = 2381	*N* = 3,109	
Variables	% or mean (SD)	% or mean (SD)	% or mean (SD)	% or mean (SD)	% or mean (SD)	% or *M* (*SD*)	Total
Demographic characteristics							
Age (retirees excluded)							
Age (mean)	44.6 (8.1)	45.8 (9.5)***	45.3 (9.0)	27.6 (17.7)	19.8 (17.6)***	21.3 (18.5)***	31.07 (12.3)
Age category							
Below 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 above	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%
Other characteristics							
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%
No. of dependents	1.8 (1.4)	1.7 (1.4)*	1.8 (1.4)	—	—	—	1.8 (1.4)
Health status							
Chronic diseases[a]							
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 I and II diabetes	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 (excluding < 18)	**0.26 (0.55)**	**0.29 (.59)**	**0.32 (0.63)*** **	0.23 (0.53)	0.19 (0.46)*	.20 (.50)	.26 (.57)
Present with ≥1 of 5 diseases above	**21.5%**	**22.8%**	**24.9%***	**14.1%**	**11.1%*** **	**11.2%*** **	15.9

Note. HCC = health care center. Boldedface text just indicates that a significant difference exsists for one or more of the types of users

[a]Anyone with at least two claims having this diagnosis.

*Significant at the .05 level (two-tailed test). **Significant at the .01 level (two-tailed test). ***Significant at the .001 level (two-tailed test).

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