ORIGINAL RESEARCH

Primary Care Attributes Associated with Receipt of Preventive Care Services: A National Study

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Background: **Primary care attributes (PCAs) encompassed by patient-centered medical homes may increase receipt of preventive care, though national studies are lacking.**

Methods: **We performed cross-sectional adjusted analyses of self-report data from adults in the 2007 to 2010 US Medical Expenditure Panel Surveys (N = 50,457). PCAs were considered individually and as a total score for each respondent and included comprehensiveness (a usual source of care for new and ongoing problems, preventive care, and referrals); patient-centeredness (shared decision making); and enhanced access (night and weekend hours). Preventive care measures included mammography, influenza vaccination, annual exams, colorectal cancer screening, and Papanicolaou, prostate-specific antigen, and cholesterol testing.**

Results: **The total PCA score was positively associated with increased receipt of each preventive care measure. Colorectal cancer screening (18.5%) and prostate-specific antigen testing (20.7%) showed the largest increases across PCA score quartiles. Individual primary care attributes except enhanced access were positively associated with each preventive care measure. Enhanced access was negatively associated with annual examination (adjusted odds ratio, 0.83; 95% confidence interval, 0.77–0.91).**

Conclusion: **In a nationally representative sample, greater reported exposure to key primary care attributes, with the exception of enhanced access, was associated with increased preventive care. These findings may inform best practices for maximizing preventive care delivery. (J Am Board Fam Med 2015; 28:733–741.)**

Keywords: **Medical Home, Preventive Medicine**

In national studies, greater patient-reported access to core primary care attributes,[1,2] including comprehensiveness and patient-centeredness, is associated with reduced mortality.[3] These attributes are now encompassed in the joint principles of the patient-centered medical home (PCMH).[4] The joint principles also add further attributes to the definition of the PCMH, including enhanced access to care (eg, availability of evening and weekend office hours), which has previously been associated with less emergency department use and fewer total health care expenditures.[5,6] Despite the emphasis placed on comprehensiveness, patient-centeredness, and extended access in prevailing health care redesign efforts, how these attributes influence utilization of preventive services at the national level is little studied. Existing research consists of ecological studies,[7] small pilot projects,[8] and larger comparative studies.[9,10] However, nearly all have been limited to a relatively narrow group of patients (eg, those with certain chronic diseases, geriatric patients, pediatric patients) and/or to a single geographic site (eg, managed care organizations, hospital regions, single primary care practices). This is a key research gap, given that optimizing preventive care is a common goal among primary care providers, patients, and policymakers.[11–13]

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Only 1 prior national study has explored whether patient access to such primary care attributes is associated with the receipt of preventive care services.[14] Using data from the 2005 Medical Expenditure Panel Survey (MEPS), the authors examined how a cluster of primary care attributes, including measures reflecting comprehensiveness, patient-centeredness, and enhanced access, was globally associated with the utilization of several types of preventive care (cholesterol testing, blood pressure measurement, mammography, and prostate-specific antigen [PSA] testing). The study found that having a usual source of care (USOC) that featured the aforementioned primary care attributes was associated with higher rates of preventive services delivery. The study did not examine the independent associations of the individual primary care attributes with the various preventive care outcomes considered. Thus, it is unclear whether each of the components in the cluster contributed to increased preventive care or, if so, how strongly each attribute influenced preventive care. Studying the associations of individual core primary care attributes with the delivery of a range of common preventive services at a national level could help to identify the specific primary care attributes that are most useful to target as part of ongoing practice redesign efforts to improve preventive services delivery.

Using data from the 2007 to 2010 national MEPS, the associations of patient-reported access to selected primary care attributes—comprehensiveness, patient-centeredness, and enhanced access—with receipt of an array of preventive care services (colorectal cancer [CRC] screening; Papanicolaou, mammography, cholesterol, and PSA testing; influenza vaccination; and routine annual exams [ie, preventive care or "checkup" visits]) were examined. Based on prior research,[10,15,16] we hypothesized that greater patient-reported exposure to the studied primary care attributes, whether considered as a cluster (collectively) or individually, would be associated with increased utilization of each of the studied preventive services.

Methods

We used data from the MEPS Household Component (HC) survey data sets. The MEPS is an annual national survey of health care cost and utilization in the United States, which collects survey data over a 2-year period from each individual. The HC includes items detailing sociodemographics, geographical information, health insurance, health utilization, and health care expenditures in addition to questions regarding health conditions and health status. We weighted the cluster-based sample data set to approximate a nationally representative sample of the United States. Included in this study were all respondents aged 18 and older from years 2007 to 2010; response rates were 56.9%, 59.3%, 57.2%, and 53.5%, respectively, for the survey years included.

Measures

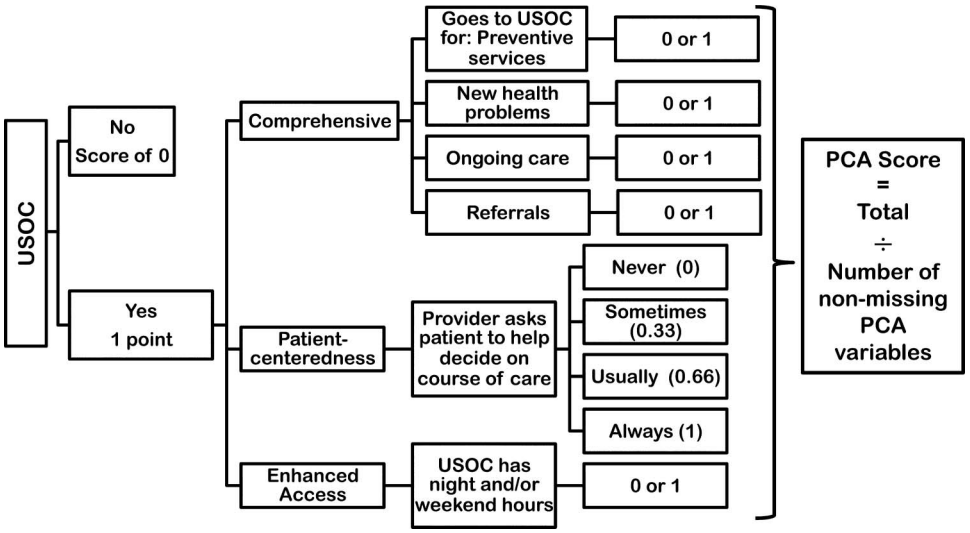
Primary Care Attributes

We identified primary care attributes from participants' responses to individual items included in the MEPS HC questionnaire. Respondents who denied having a USOC were assigned a PCA score of 0, and no further attributes were credited. For respondents indicating a USOC, we examined their answers to questionnaire items reflecting 3 core attributes of primary care: comprehensiveness, patient-centeredness, and enhanced access. Comprehensiveness of care was determined by 4 yes (1 point)/no (0 points) items, asking whether they visited the USOC for (1) preventive services, (2) new health problems, (3) ongoing care, and (4) referrals. Patient-centeredness of care was assessed with a single item, using a 4-point Likert response scale (0 = never, 0.33 = sometimes, 0.66 = usually, 1 = always), asking whether the USOC invites the patient to help in determining care. Enhanced access to care was assessed with a single yes (1 point)/no (0 points) item, asking whether the USOC offers night or weekend hours. A total mean primary care attribute score was calculated (scaled to a range of 0 to 1) by summing responses to each answered question and dividing by the number of nonmissing questions, thus minimizing error based on missing data from any one primary care attribute question. Figure 1 shows the algorithm used to calculate the total mean primary care attribute score.

Preventive Care Measures

Preventive care measures identified from the MEPS HC included mammography, Papanicolaou, cholesterol, and PSA testing; CRC screening; influenza immunization; and routine annual exams. Criteria for adherence was, whenever possible, based on

Figure 1. Calculation of the total primary care attributes score. PCA, primary care attribute; USOC, usual source of care.



recommendations from the US Preventive Services Task Force and the Centers for Disease Control and Prevention Advisory Committee on Immunization Practices that were in existence during the study period.[17–21] We used common practice when guidelines were not available or at odds with common practice.[22,23] We included mammography data for female respondents aged ≥40 years and defined *adherent* as reporting a mammogram within the past 2 years for those ≥50 years and ever reporting a mammogram for those 40 to 49 years old. Papanicolaou testing was included for female respondents aged 21 to 65 years old and was defined as adherent if performed within the past 3 years. Cholesterol testing was included for all respondents aged ≥35 years and defined as compliant if performed within the past year. CRC screening was included for all respondents aged ≥50 years. This combined item used respondents' answers to questions about fecal occult blood testing, sigmoidoscopy, and colonoscopy. For the years 2007 to 2008, we defined *adherent* as an answer of "yes" to whether the respondent had ever had a colonoscopy and/or sigmoidoscopy. Because of changes to the questionnaire after 2008, for the years 2009 to 2010 we defined *adherent* as having had a colonoscopy in the past 10 years, a sigmoidoscopy in the past 5 years, or a fecal occult blood test in the past 1 year. PSA data were included for all male respondents aged ≥50 years and were defined as adherent if the respondent reported testing in the past 2 years. We included annual examination data for all respondents aged ≥18 years and defined *compliance* as having had an examination within the last year.

Sociodemographic Variables

The following sociodemographic variables were included: age (years); sex; race/ethnicity (white, black, Hispanic, or other); insurance status (any private, only public, or uninsured); education level (none, elementary only, some high school, completed high school, some college, completed college); family income as a percentage of the federal poverty level (<100%, 100% to 124%, 125% to 199%, 200% to 399%, or ≥400%); and geographic region (North, Midwest, South, West).

Health-Related Variables

Five additional health-related variables were included in the analysis to control for other factors that may affect preventive care.[24–26] Skepticism regarding medical care was measured with a previously validated[27] scale based on Likert-type responses to 4 items (scores ranged from 1 to 5): "do not need health insurance," "health insurance not worth cost," "more likely to take risks than the average person," and "can overcome ills without medical help" (the Cronbach α in this data set was 0.67). We controlled for health behavior with 3 separate measures: current smoking status (smokers = 1, others = 0); seatbelt use ("always" or "nearly always" scored 0, all others scored 1); and whether the respondent was obese (body mass index ≥30 kg/m^2 = 1, others = 0). We measured

disease burden as a count of 13 chronic conditions (score range, 0 to 12): hypertension, coronary heart disease, angina, heart attack, other heart disease, stroke, emphysema, chronic bronchitis, high cholesterol, cancer, diabetes, arthritis, and asthma. High cholesterol was not included as a chronic disease in analyses of cholesterol testing. Scores of the 12-item Short Form Mental Component Summary and Physical Component Summary were used to measure mental and physical health status.[28]

Data Analysis

Data were analyzed using Stata version 12.1 (StataCorp, College Station, TX). We used longitudinal strata, primary sampling unit identifiers, and survey weights to account for the nonrandom sampling technique in the MEPS.

Logistic regression models were used to examine the association between the key independent variable (total primary care attribute score, a continuous variable) and adherence (or not) to each preventive care measure (dependent variable). In addition, we performed a separate analysis of each individual primary care attribute measure and its association with each preventive care measure using logistic regression. We adjusted analyses for panel year, sociodemographic variables, and health-related variables. We then used the primary care attribute score as a grouped ordinal variable, using cut points based on sample size and distribution of the number of primary care attributes to examine effects on preventive care measures.

Results

A total of 68,829 respondents participated in the 2007 to 2010 MEPS; data for the primary care attributes of interest were available for 50,457 (94.5%). Respondents with missing primary care attribute items were as follows: usual source of care, 2754 (5.5%); ongoing source of care, 33 (0.1%); preventive care, 31 (0.1%); care for referrals, 45 (0.1%); night and weekend hours, 2629 (5.2%); and patient-centeredness, 1965 (3.9%).

Tables 1 and 2 summarize the sample characteristics by primary care attribute score. The sample had an overall mean attribute score of 0.66. Respondents who were female, white, had some form of insurance (public or private), had completed college, had a higher income, or lived in the Northeast had higher mean scores.

Table 3 shows the adjusted associations between primary care attribute score and preventive care measures. The primary care attribute score was positively associated with compliance with each preventive care measure; strength of association was strongest for PSA testing and weakest for influenza vaccination.

Table 4 shows the adjusted associations of the individual primary care attributes and the study preventive care measures. Most of the study primary care attributes were positively associated with some or all the preventive care measures. Exceptions were that having a regular provider of ongoing care for problems had no association with Papanicolaou testing; patient-centeredness had no association with CRC screening; and night and weekend hours were not significantly associated with any of the preventive care measures except for having an annual examination, for which there was a significant negative association. Having a regular provider for preventive care needs, referrals, and new problems were positively associated with all the preventive care measures examined.

Table 5 shows compliance with each preventive care measure based on primary care attribute score quartile. Compliance prevalence was highest in the second highest quartile, without further increase above this. We noted the largest increase in compliance from lowest to highest quartile for CRC and PSA screening, whereas the smallest increase was noted for Papanicolaou testing.

Discussion

In a large national sample, higher patient-reported exposure to selected primary care attributes was associated with increased utilization of an array of preventive care services. The associations persisted after adjusting for multiple likely confounders, including sociodemographics, medical skepticism, health behaviors, and comorbidity. Analysis by primary care attribute component showed consistently positive associations between preventive care measures and having a regular provider for prevention, referrals, and new problems—measures of comprehensive care. Overall, these findings suggest that greater exposure to primary care attributes now encompassed by the PCMH is associated with increased preventive care utilization.

Notably departing from this general pattern were the findings regarding extended access, mea-

Table 1. Sample Characteristics by Primary Care Attribute Score

	No.	Proportion	PCA Score (SE)
Total	50,457	100%	0.66 (0.004)
Age (years)			
18–44	24,991	46.71%	0.57 (0.006)
45–54	9,096	18.57%	0.69 (0.006)
55–64	7,297	16.18%	0.74 (0.005)
≥65	8,019	18.54%	0.80 (0.004)
Sex			
Male	23,056	48.49%	0.62 (0.005)
Female	26,347	51.51%	0.71 (0.004)
Race			
White	23,161	67.84%	0.70 (0.005)
Black	9,378	11.58%	0.62 (0.007)
Hispanic	12,340	13.95%	0.51 (0.009)
Other	4,524	6.64%	0.63 (0.013)
Insurance			
Private, any	10,507	15.39%	0.71 (0.004)
Public only	28,636	67.42%	0.73 (0.006)
Uninsured	10,260	17.19%	0.37 (0.009)
Education level			
None	273	3.00%	0.49 (0.024)
Elementary only	4,294	5.53%	0.59 (0.012)
Some HS	7,872	13.04%	0.62 (0.007)
Completed HS	14,953	2.99%	0.65 (0.006)
Some college	10,645	23.97%	0.68 (0.006)
Completed college	10,570	27.27%	0.71 (0.006)
Income			
Poor/negative	8,864	12.40%	0.56 (0.007)
Near poor	2,904	4.31%	0.60 (0.012)
Low income	8,086	13.69%	0.60 (0.009)
Middle income	15,234	30.54%	0.66 (0.007)
High income	14,315	39.05%	0.73 (0.005)
Region			
North	7,615	18.42%	0.75 (0.008)
Midwest	9,844	21.89%	0.71 (0.009)
South	18,473	36.53%	0.61 (0.008)
West	12,994	23.17%	0.64 (0.008)
Panel			
2007	10,905	19.52%	0.68 (0.006)
2008	14,946	30.99%	0.65 (0.007)
2009	13,254	24.63%	0.66 (0.007)
2010	11,352	24.87%	0.67 (0.006)
Health-related variables			
Smoking status			
Nonsmoker	34,503	80.75%	0.68 (0.005)
Current smoker	8,031	19.25%	0.59 (0.007)
Seatbelt use			
Always or almost always	45,237	93.63%	0.67 (0.004)
Less frequently	2,934	6.37%	0.60 (0.012)
Obesity			
BMI <30 kg/m^2	32,867	71.04%	0.65 (0.005)
BMI ≥30 kg/m^2	13,957	28.96%	0.70 (0.005)
Chronic health conditions (n)			
0	22,973	42.83%	0.56 (0.007)
1	10,270	21.44%	0.67 (0.005)
2	6,311	13.97%	0.76 (0.006)
3	4,227	9.21%	0.79 (0.005)
≥4	5,622	12.56%	0.82 (0.004)

*Total number of primary care attribute (PCA) variables endorsed by the respondent divided by total nonmissing PCA variables. Scores ranged between 0 and 1, with a population mean of 0.66.
HS, high school; SE, standard error; BMI, body mass index.

sured as the availability of evening and weekend hours, which was negatively associated with receipt of an annual examination and not significantly associated with any of the other preventive care services. This finding may reflect that visits during nontraditional office hours are more likely to focus on urgent or acute issues. Such a focus might preempt preventive care, particularly more time-consuming preventive activities such as performing a Papanicolaou test or discussing CRC screening options or the pros and cons of PSA testing.[29,30] In addition, patients who value extended access may be more likely to seek out practices that offer it and to recognize (and report) that it is available, and such individuals may place a lower premium on prevention. While extended office hours have been associated with lower overall health care costs and fewer emergency department visits,[5,6] these findings underscore the need for further investigation of their impact on care outcomes, including preventive care.

Table 2. Sample Characteristics for Continuous Health-related Variables

	No.	Mean (SE)
Mental health (MCS-12)	45,722	50.9 (0.1)
Physical health (PCS-12)	45,712	49.5 (0.1)
Medical skepticism	45,421	2.1 (0.01)

MCS-12, 12-item Short Form Mental Component Summary; PCS-12, 12-item Short Form Physical Component Summary; SE, standard error.

Table 3. Adjusted Associations of the Primary Care Attribute Score with Preventive Care Adherence*

	AOR (95% CI)
Mammography	2.46 (2.13–2.84)
CRC screen	2.74 (2.35–3.19)
Papanicolaou test	2.09 (1.78–2.45)
Influenza vaccination	1.84 (1.69–2.01)
Annual exam	2.38 (2.21–2.58)
Cholesterol test†	3.55 (3.07–4.10)
PSA test	3.28 (2.71–3.98)

*Adjustors: demographics, medical skepticism, health behaviors, disease burden, and mental and physical health status as measured by the 12-item Short Form Mental Component Summary and Physical Component Summary scores.
†A diagnosis of high cholesterol was excluded from this measure's disease burden control variable.
AOR, adjusted odds ratio; CI, confidence interval; CRC, colorectal; PSA, prostate-specific antigen.

The analysis of primary care attributes score by quartiles showed a gradient of respondents reporting prevention compliance from lowest to highest quartiles. There was little difference between the highest and second highest quartiles, suggesting a ceiling effect of a certain level of exposure to primary care attribute components. Alternatively, this could reflect the lack of increased preventive care benefit seen with the addition of night and weekend hours. Overall, the largest increase across quartiles occurred for CRC screening and PSA testing, both of which usually require a more detailed patient–provider interaction than items such as influenza vaccination or mammography. Though PSA was graded as an "I" recommendation by the US Preventive Services Task Force at the time of study data collection, it was increasingly considered the standard of care at the turn of the century.[23] Interestingly, the individual analysis of patient-centeredness failed to show an association with CRC screening, which may indicate that, with counseling, patients feel they can opt out of this screening. Such an interpretation is supported by prior research regarding the effects of shared decision making on patient cancer screening decisions.[31,32]

Papanicolaou testing and influenza vaccination had the weakest strength of association across individual primary care attributes. Both Papanicolaou testing and the influenza vaccine are readily available in the United States through non-USOC providers (eg, Planned Parenthood for Papanicolaou testing, pharmacies or public health departments

Table 4. Adjusted Odds Ratios of Individual Primary Care Attribute Components by Compliance with Preventive Care Measures*

	Usual Source of Care	Patient-centeredness	Enhanced Access (Night and Weekends)	Comprehensiveness				Composite
				Preventive Care	Referrals	New Problems	Ongoing Care	
Mammography	2.30 (2.02–2.63)	1.33 (1.10–1.59)	0.94 (0.84–1.06)†	1.52 (1.22–1.90)	1.32 (1.07–1.63)	1.48 (1.17–1.88)	1.50 (1.17–1.92)	1.53 (1.21–1.95)
CRC screen	2.66 (2.30–3.08)	1.16 (1.00–1.35)†	0.97 (0.87–1.07)†	1.83 (1.48–2.26)	1.62 (1.33–1.98)	1.61 (1.30–1.99)	1.60 (1.29–1.99)	1.80 (1.43–2.26)
Pap test	1.99 (1.73–2.29)	1.30 (1.09–1.55)	0.94 (0.83–1.08)†	1.37 (1.10–1.70)	1.24 (1.01–1.52)	1.26 (1.01–1.56)	1.21 (0.97–1.51)†	1.31 (1.04–1.65)
Flu shot	1.75 (1.62–1.89)	1.25 (1.13–1.38)	0.99 (0.92–1.07)†	1.38 (1.21–1.57)	1.38 (1.22–1.56)	1.43 (1.26–1.63)	1.43 (1.26–1.63)	1.48 (1.29–1.70)
Annual exam	2.26 (2.11–2.42)	1.37 (1.23–1.53)	0.83 (0.77–0.91)‡	1.47 (1.31–1.64)	1.36 (1.21–1.52)	1.38 (1.22–1.57)	1.46 (1.31–1.64)	1.48 (1.32–1.67)
Cholesterol tests	3.08 (2.71–3.49)	1.59 (1.28–1.96)	0.98 (0.84–1.15)†	1.98 (1.59–2.47)	1.68 (1.32–2.13)	1.75 (1.37–2.24)	2.07 (1.65–2.60)	2.01 (1.58–2.55)
PSA screen	3.05 (2.56–3.64)	1.35 (1.10–1.65)	0.91 (0.78–1.05)†	2.08 (1.61–2.71)	2.11(1.62–2.73)	1.93 (1.47–2.53)	1.91 (1.47–2.46)	2.24 (1.69–2.97)

Data are adjusted odds ratios (95% confidence intervals).
*Adjustors: demographics, medical skepticism, health behaviors, disease burden, and mental and physical health status as measured by the 12-item Short Form Mental Component Summary and Physical Component Summary scores.
§A diagnosis of high cholesterol was excluded from this measure's disease burden control variable.
†No statistically significant effect on compliance with preventive care measure.
‡Statistically significant negative effect on compliance with preventive care measure.
CRC, colorectal cancer; Flu, influenza; Pap, Papanicolaou; PSA, prostate-specific antigen.

Table 5. Percentage of Respondents Adherent to Preventive Care Measures by Primary Care Attribute Score Quartile*

	Quartile			
	Lowest (0–0.49)	Second Lowest (0.5–0.79)	Second Highest (0.8–0.89)	Highest (≥0.9)
Mammography	62.5 (60–65)	75.5 (73–78)	78.9 (78–80)	76.9 (75–78)
CRC screening	40.6 (38–43)	58.7 (55–62)	60.9 (59–62)	59.1 (57–61)
Papanicolaou test	78.4 (77–80)	85.3 (83–87)	87.3 (86–88)	86.3 (85–88)
Flu vaccination	29.2 (28–31)	37.8 (36–40)	40.4 (39–41)	39.1 (38–40)
Annual exam	51.5 (50–53)	64.6 (62–67)	69.2 (68–70)	65.4 (64–67)
Cholesterol test†	82.3 (81–84)	91.2 (90–93)	92.7 (92–94)	92.0 (91–93)
PSA test	45.5 (42–49)	65.9 (62–70)	69.6 (68–71)	66.2 (64–69)

Data are percentages (95% confidence intervals).
*Adjustors: demographics, medical skepticism, health behaviors, disease burden, and mental and physical health status as measured by the 12-item Short Form Mental Component Summary and Physical Component Summary scores.
†A diagnosis of high cholesterol was excluded from this measure's disease burden control variable.
CRC, colorectal cancer; Flu, influenza; PSA, prostate-specific antigen.

for the influenza vaccination). Thus these measures of prevention are likely to be less dependent on an individual having a USOC that provides these services.

This study had limitations. Most important, it does not allow us to infer causal direction, as patients who place a higher value on preventive care are possibly more likely to seek out this type of care, beyond effects captured by the medical skepticism measure. There was potential for self-report bias: Patients who have a tendency to use preventive services may also be more likely to report exposure to the primary care attributes studied, independent of actual exposure. In addition, only selected primary care attributes are assessed in the MEPS. Other data sources are required to study additional attributes encompassed by the PCMH. Though some data were missing for the key predictor variables in our analyses, the amount of missing data was small, suggesting this would be unlikely to threaten the generalizability of our findings. In addition, the MEPS design does not allow for distinguishing between receiving testing for primary prevention or for other purposes (ie, known disease monitoring). The most problematic prevention variable in this regard is likely to be cholesterol testing, whereas others, such as influenza vaccination, are more purely preventive in nature. In addition, for CRC screening, given the long up-to-date period following endoscopic screening, some individuals reporting up-to-date status in our study may have undergone screening well before their period of MEPS participation. For these respondents, the attributes of the USOC may have changed in the interval between screening and MEPS participation. Nonresponse error to the MEPS may limit the generalizability of these findings to nonresponders; however, we believe that this is the most representative sample currently available to study these associations. Our study was not designed to measure any actual health benefits of receipt of preventive care, and since the study period includes recommendations for screening that were standard of care at the time, but are now considered of questionable health benefit (annual exams and PSA testing), it is important not to equate utilization with derivation of benefit.

Conclusion

In a national sample, greater patient-reported exposure to key primary care attributes subsumed within the PCMH definition—comprehensiveness and patient-centeredness—was associated with increased receipt of preventive care. However, these attributes varied in how strongly they were associated with each of the preventive services examined. Further, one primary care attribute studied—access to night and weekend hours—was negatively associated with receipt of annual exams. As primary care delivery models of care continue to evolve, these findings may be useful in informing best practices for optimizing the delivery of preventive care services.

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