Usual Source of Care in Preventive Service Use: A Regular Doctor versus a Regular Site

K. Tom Xu

Objective. To compare the effects of having a regular doctor and having a regular site on five preventive services, controlling for the endogeneity of having a usual source of care.

Data Source. The Medical Expenditure Panel Survey 1996 conducted by the Agency for Healthcare Research and Quality and the National Center for Health Statistics.

Study Design. Mammograms, pap smears, blood pressure checkups, cholesterol level checkups, and flu shots were examined. A modified behavioral model framework was presented, which controlled for the endogeneity of having a usual source of care. Based on this framework, a two-equation empirical model was established to predict the probabilities of having a regular doctor and having a regular site, and use of each type of preventive service.

Principal Findings. Having a regular doctor was found to have a greater impact than having a regular site on discretional preventive services, such as blood pressure and cholesterol level checkups. No statistically significant differences were found between the effects a having a regular doctor and having a regular site on the use of flu shots, pap smears, and mammograms. Among the five preventive services, having a usual source of care had the greatest impact on cholesterol level checkups and pap smears.

Conclusions. Promoting a stable physician–patient relationship can improve patients' timely receipt of clinical prevention. For certain preventive services, having a regular doctor is more effective than having a regular site.

Key Words. Usual source of care, preventive services, endogeneity, behavioral model

It has been well established that continuity of care is an important component of the quality of medical care (Starfield 1992). Lack of a usual source of care not only interrupts continuity of care but also imposes a significant barrier to receiving medical treatment. Having a usual source care is similar to having health insurance in the sense that both facilitate timely and adequate receipt of needed medical care (Baker, Stevens, and Brook 1994; Chen and Lyttle 1987; Davis and Rowland 1983; Donelan et al. 1996; Rask et al. 1994; Robert Wood Johnson Foundation 1983; Saver and Peterfreund 1993; Weissman and Epstein 1993). In the Andersen–Aday behavioral model, both are considered

enabling factors. Because both lack of a usual source of care and lack of insurance hinder care-seeking, Sox et al. (1998) attempted to compare the power of having a regular physician and having insurance in predicting individuals' access to health services. They concluded that, compared to having health insurance, having a regular physician was a stronger and more consistent predictor of patients' delay in seeking care, having no physician visits, and having no emergency department visits.

The function of a usual source of care has been extensively discussed in the health services, public health, and medical literature. Age, gender, race, ethnicity, income, education, insurance status, and health status were found to be common correlates of having a regular source of care (Hayward et al. 1991; Hayward et al. 1988; Merzel 2000; Newacheck, Pearl et al. 1998; Newacheck, Stoddard et al. 1998; Rask et al. 1994; Schur, Albers, and Berk 1995; Shi 1999; Weinick and Drilea 1998; Zuvekas and Weinick 1999). Having a usual source of care was demonstrated to be positively correlated with an individual's general access to the health care system (Weissman et al. 1991), improvement of patients' satisfaction with medical care (Hurley, Gage, and Freund 1991), a decrease in the use of the emergency department (Newschaffer et al. 1999), a reduction in the likelihood of hospital admission (Weiss and Blustein 1996), and promotion of proper use of medication (Smith and Kirking 1999).

In addition to improving access and utilization of medical care, having a usual source of care can facilitate the use of clinical prevention services in the population. It appears that adequate clinical prevention, such as immunization and cancer screening, can be better achieved through a usual source of care because the care provider has a more comprehensive understanding of a patient's health needs. Specifically, empirical evidence found that individuals with a usual source of care were more likely to receive timely immunizations (Flocke, Stange, and Zyzanski 1998; Frank et al. 1995; Mark and Paramore 1996) and that women who had a usual source of care were more likely to receive breast and cervical cancer screening (Bindman et al. 1996; Ettner 1996; Kagawa-Singer and Pourat 2000; O'Malley et al. 1997; Zambrana et al. 1999). In addition, one study demonstrated that having a usual source of care promoted healthier behaviors, such as exercise and quitting smoking (Ettner 1999).

Although many studies have investigated the effect of having a usual source of care on an individual's care-seeking behavior, most do not

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distinguish between having a regular doctor and having a regular site. Because of the positive association between having a regular doctor and improved access to care (Alpert et al. 1970; Becker, Drachman, and Kirscht 1974; Dietrich and Marton 1982; Starfield 1992), patients' preferences to see their usual physicians were included as one of the four domains in the Components of Primary Care Instrument (Flocke 1997). In two earlier studies comparing the effects of having a regular site and having a regular doctor (Marcus and Stone 1984; Scitovsky, Benham, and McCall 1979), it was found that having a regular doctor resulted in a higher frequency of physician visits relative to having a regular site.

One study pointed out that there was significant heterogeneity across different types of usual source of care (Lambrew et al. 1996). Individuals who had a regular doctor had a different care-seeking pattern from those who had a site as their regular source of care. Also, they found that the comparative advantage of having a regular doctor over having a regular site was diminished when nonmainstream sites (emergency rooms, outpatient departments, and family health centers) were excluded from the analysis. Another study found that the contribution of a regular doctor to consumers' perception of access was marginal when optimal primary care was provided at a site (Stewart et al. 1997).

The notion that continuity and adequacy of care are improved by having a usual source of care may have different implications in different types of health services. In particular, from a patient's perspective, prevention is more voluntary (i.e., a matter of choice) than acute care. Having a usual source of care, in concept, can facilitate such planning. Although it is known that having a usual source of care improves access to preventive services, as discussed, whether a regular doctor contributes more than a regular site to the improvement of access to preventive services is yet to be explored.

To further our understanding of the role of a usual source of care in ensuring that adequate and continuous prevention can be provided to the population, this study examined the relative effectiveness of having a regular doctor as compared to a regular site on individuals' use of various preventive services. Following Ettner (1996; 1999) and Kuder and Levitz (1985), in which the endogeneity of having a usual source of care was controlled for, this study answered the following questions:

1. Does having a regular doctor have a greater impact on a patient's receipt of preventive services than having a regular site?
2. In what preventive services do we observe the comparative advantage of having a regular doctor over having a regular site?

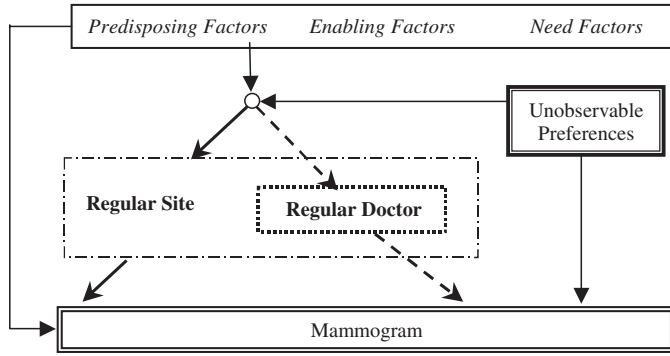
CONCEPTUAL FRAMEWORK

Intuitively, individuals, especially those who have one or more chronic conditions, would prefer having a usual source of care in order to receive continuous monitoring and medical attention. Also, having a usual source of care can improve the timeliness and comprehensiveness of the receipt of preventive care for health conscientious or risk-averse individuals. Because both groups of individuals are concerned about their health, they may seek out services more aggressively (Ettner 1999). Thus, when a usual source of care is present in the service utilization process of these two groups of individuals, more observed service use does not necessarily imply that the usual source of care is the cause of the increased utilization of prevention. The endogeneity of having a usual source of care was also examined by Kuder and Levitz (1985), in which they conceptualized the relationship between having a usual source of care and physician visits under the behavioral model specification (Aday and Andersen 1984; Andersen and Aday 1978; Andersen and Newman 1973; Andersen 1995).

In a traditional behavioral model, individuals' predisposing, enabling, and need factors are used in predicting service use. Having a usual source of care, one of the enabling factors, is treated as predetermined (i.e., independent of predisposing, need, and other enabling factors) in explaining service use. However, numerous empirical studies rejected such an independence assumption (Hayward et al. 1991; Hayward et al. 1988; Merzel 2000; Rask et al. 1994; Schur, Albers, and Berk 1995). In these studies, the probability of having a usual source of care was modeled by using a subset of predisposing, enabling, and need factors, such as insurance status, as explanatory variables. Thus, the traditional behavioral model did not capture the intermediacy of having a usual source of care in linking predisposing, enabling, and need factors to service use. More importantly, many previous studies ignored the fact that the choice of a usual source of care was correlated with the error term in a regression of service use, controlling for observable consumer characteristics. Figure 1 illustrates a modified structure of the behavioral model.

An individual has a choice between a regular site and a regular doctor (and no usual source of care), as indicated by the two arrows starting at the decision node. This choice is determined by predisposing, enabling, and need factors. The chosen usual source of care, a regular doctor or site, along with predisposing, enabling, and need factors, affects discrete preventive service use (mammogram is shown for illustration purpose). However, the effect of

Figure 1: Modified Behavioral Model with Endogenous Usual Source of Care.



having a regular doctor on service use (solid arrows) may be different from that of having a regular site (dashed arrows). Furthermore, unobservable preferences of the consumers, such as their risk aversion and health conscientiousness, affect both the use of preventive services and the choice of a usual source of care. That is, the consumers who are likely to use prevention may be those who are likely to have a usual source of care, controlling for their observable characteristics. Figure 1 demonstrates that the unobservable preferences cause the endogeneity of the choice of a usual source of care.

Driven by the unobservable preferences, individuals who are likely to use more preventive services may choose to have a regular doctor or site. With the presence of the unobservable preferences, a single-equation estimation not incorporating the correlation between the error terms in the equations for having a usual source of care and service use may provide misleading information to health care policymakers, causing them to over- or under-promote the benefits of having a usual source of care. Ettner (1996) showed that when the endogeneity of having a usual source of care was controlled for, the impact magnitude of having a usual source of care was smaller than in an estimation where the endogeneity was not controlled. This type of bias was also found by Kuder and Levitz (1985).

Based on the conceptualization illustrated in Figure 1, this study focused on how having a regular doctor differs from having a regular site in affecting the use of five preventive services: mammograms, pap smears, blood pressure checkups, cholesterol level checkups, and flu shots. The probabilities of having a usual doctor, a regular site, and no usual source of care were analyzed

first in the selection stage. It was followed by the examination of the impact of having a regular doctor and having a regular site on the utilization of each above-mentioned preventive service, while incorporating individuals' unobservable preferences in the selection stage.

EMPIRICAL ESTIMATION

Empirical Model

Following Figure 1, two equations were used for the estimation. The dependent variables were an individual's choice of a usual source of care (a regular doctor, a regular site, or no usual source care), denoted by *USC,* and preventive service use, *Y.*

$$\text{Prob}(USC) = f(\text{predisposing, enabling, needs, error term I}) \quad (1)$$

$$Y = g(\text{predisposing, enabling, needs, } USC, \text{error term II}) \quad (2)$$

An endogenous treatment effect model, an extension of a selection model, would be appropriate for analyzing the relationship between having a usual source of care and service use, as described above. Numerous analogies of the relationship between a usual source of care and service use can be found in the economics literature. Individuals purchase insurance because they foresee future use of medical care (Dowd et al. 1988). Workers join a union because they expect higher wages (Svejnar 1980). Consumers who purchase cars are those who travel frequently (Truong and Hensher 1985). Individuals who buy energy efficient appliances are those who use the appliances frequently (Revelt and Train 1997). In this study, a control function estimation was used to operationalize the endogenous treatment effect model.

The control function model takes the form of a two-stage estimation. The first stage, the selection, predicts the probabilities of having no usual source of care, having a regular doctor, and having a regular site, respectively, given predisposing, enabling, and need factors. The second-stage estimation incorporates the transformations of the predicted probabilities from the first stage. Let I_0, I_d, and I_s be binary dummy variables indicating having no usual source of care, having a regular doctor, and having a regular site. Without the control for selection, the prediction of service use can be written as

$$Y = X\beta + \gamma_1 I_d + \gamma_2 I_s + \mu$$

where X represents the vector of predisposing, needs, and other enabling factors. Incorporating the selection using the control function model, we have

$$Y = X\beta + \gamma_1 I_d + \gamma_2 I_s + \alpha_0(1 - I_d - I_s)\lambda_0 + \alpha_d I_d \lambda_d + \alpha_s I_s \lambda_s + v$$

The λ's are the transformations of the probabilities predicted from the first stage (Heckman 1978; 1979; 1990; Lee 1982; 1983). They are the correction factors similar to the correction factor (inverse Mill's ratio) in a Heckman correction model where the response variable in the first stage is binary rather than multicategorical (Heckman 1979; 1990).

Vella and Verbeek (1999) showed that testing for the presence of endogeneity is equivalent to testing whether α's are zero. With the incorporation of the endogeneity control, the effects of having a regular doctor (I_d) and having a regular site (I_s), conditional on the choice of a usual source of care, are $\gamma_1+(\alpha_d\lambda_d-\alpha_0\lambda_0)$ and $\gamma_2+(\alpha_s\lambda_s-\alpha_0\lambda_0)$, respectively.* A single-equation estimation that regresses utilization over having a usual source of care would provide biased results of the effect of having a usual source of care because of the omitted correction terms.

Data and Key Variables

Data used to identify the determinants of having a regular doctor or site and how having a regular doctor or site affects the utilization of prevention were extracted from the Medical Expenditure Panel Survey (MEPS), conducted by the Agency for Healthcare Research and Quality and the National Center for Health Statistics (Agency for Healthcare Research and Quality 1999). The household survey component from 1996, which contained detailed data on demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance, and income and employment, was used. More than twenty thousand individuals representing the U.S. population were surveyed. More details on the information collected by the MEPS 1996 can be found in other studies (Cohen 1997; Vistnes and Monheit 1997).

Because the questions regarding preventive service use were asked only of individuals aged 18 years and older, individuals aged 17 years and younger were excluded from the analyses. Also, to provide national estimates using the MEPS survey, individuals whose person weights were zero or negative, were excluded. There were 15,501 individuals satisfying these two selection criteria. Whether an individual had a regular doctor, a regular site, or no usual source of care was identified. Respondents who reported having a regular site, but also indicated seeing a regular doctor at that site, were classified as having a

regular doctor. Three gender-neutral services (flu shot, blood pressure checkup, and cholesterol level checkup) and two gender-specific preventive services (mammogram and pap smear) were examined. The MEPS asked the respondents when was the last time they received each preventive service. The responses were dichotomized into (1) within the past two years and (0) before two years ago or never.

The sample composition of the 15,501 individuals is shown in Table 1. Predisposing variables were age, gender, race, ethnicity, education, marital status, region of residence, and MSA (Metropolitan Statistical Area) status. For need variables, individuals' general health status was used. Family poverty level and insurance status were included as enabling factors. Having insurance was defined as having coverage for physician and hospital services. Insurance status was grouped into: no insurance for 12 months, insured for 1–11 months, insured for 12 months by different types of plans, and insured for 12 months by the same plan.

Estimation Methodology

The probabilities of having no usual source of care, having a regular doctor, and having a regular site in the first stage were estimated by a multinomial logit model. In the selection stage, a reduced-form estimation was employed. The probabilities of having no usual source of care, a regular doctor, and a regular site were predicted for each individual. These probabilities were then transformed into the endogeneity correction terms. Whether an individual had children and the total number of conditions the children had were included as two additional exogenous variables appearing only in the selection stage.

In the second stage, the dependent variable was whether an individual did or did not receive each of the following services within the past two years: mammograms, pap smears, blood pressure checkups, cholesterol level checkups, and flu shots. The probability of receiving a service within the past two years was the Y in the equation shown in the empirical model section. The explanatory variables were predisposing, enabling, need, and the endogeneity correction factors. A probit model was used in the second stage.

Because the MEPS used a complex sampling design, person weight, primary sampling unit, and sample stratification were incorporated in the two-stage estimation to obtain nationally representative estimates and correct standard errors. The standard errors for the use of predicted probabilities were also adjusted by the weighting scheme of the MEPS. Computer software

Table 1: Sample Composition ($n = 15{,}501$)

	n^a	$\%^b$
Predisposing Factors		
Age	44.44 (17.44)[c]	
Male	7,217	46.56
Female	8,284	53.44
White	12,793	82.53
Black	2,030	13.10
Other races	678	4.37
Hispanic	2,823	18.21
Non-hispanic	12,678	81.79
< High school graduate	4,134	26.67
High school +	11,367	73.33
Not married	6,390	41.22
Married	9,111	58.78
East	3,083	19.89
Midwest	3,427	22.11
South	5,447	35.14
West	3,544	22.86
Non-MSA	3,367	21.72
MSA	12,134	78.28
Enabling Factors		
<100% poverty	2,398	15.47
100–124% poverty	787	5.08
125–199% poverty	2,232	14.40
200–399% poverty	4,803	30.99
> = 400% poverty	5,281	34.07
No insurance for 12 months	2,160	13.93
Insured: 1–11 months	1,642	10.59
Insured: 12 months on different types of insurance	264	1.7
Insured: 12 months on same insurance	8,461	57.85
Insurance missing	2,974	19.19
Need Factors		
Health: excellent	4,320	28.85
Health: very good	4,936	32.92
Health: good	4,059	25.31
Health: fair	1,600	9.39
Health: poor	580	3.52
Identifying Variables		
No children	8,710	56.19
Have children	6,791	43.81
# of children's conditions	4.40 (3.71)[c]	

[a]: sample frequencies

[b]: population proportions corresponding to the sample frequencies

[c]: population mean and standard error

STATA® version 7 (Stata Corp: College Station, TX) was used to perform the regressions controlling for the complex sampling design.

To test the presence of selection biases, an adjusted Wald test was performed for each service on the endogeneity correction terms, the λ's. The unbiased effects of having a regular doctor and a site were then calculated based on the parameter estimates. The differences in the effects of having a regular doctor and having a regular site on the five preventive services were obtained. Tests were conducted to determine whether the differences were statistically significant. The biased effects obtained through single-equation estimations were also examined.

RESULTS

Table 2 presents the cross-tabulation of the type of usual source of care and preventive service use. Among the 15,501 individuals, about 23 percent did not have a usual source of care, whereas approximately 44 percent had a regular doctor and one third had a regular site. Persons without a usual source of care had a lower proportion than individuals who had a usual source of care in receiving prevention within the past two years, a result that was significant at a 99 percent confidence level for all five preventive services. When the comparison was made between having a regular doctor and having a regular site, it was found that a regular doctor outperformed a regular site in providing blood pressure checks, cholesterol level checkups, and flu shots. However, a regular site outperformed a regular doctor in providing pap smears. These findings were significant at a 99 percent confidence level. No statistically significant difference was found between having a regular site and having a regular doctor in receiving mammograms.

Adjusted Wald tests (F tests) were used to evaluate the joint performance of the additional two exogenous variables identifying the equation. In predicting the probabilities of having a regular doctor and having a regular site, the F test scores were 11.92 and 12.55, respectively. They were significant at a 99 percent confidence level.

Table 3 shows the selected parameter estimates from the second-stage estimation. As discussed, the adjusted Wald tests of whether the coefficients of the λ's were zero were the tests for the endogeneity of having a regular doctor or site. The last column of Table 3 reports the result of the joint tests. The endogeneity of having a regular doctor or site was present for flu shots, blood pressure checkups, and cholesterol level checkups. No selection biases were

Table 2: Usual Source of Care and Utilization of Preventive Services

	n^a	*No USC*	*Regular Site*[c]	*Regular Doctor*
	15,501	*3,510 (22.64%[b])*	*5,157 (33.27%[b])*	*6,834 (44.09%[b])*
		%[b]	%[b]	%[b]
Last flu shot	15,084			
>2 yrs or never		81.58	68.19	62.21
Within the past 2 yrs		17.42	31.81	37.79
Last cholesterol level check	14,617			
>2 yrs or never		63.01	39.32	31.03
Within the past 2 yrs		36.99	60.68	68.97
Last blood pressure check	15,080			
>2 yrs or never		26.25	8.24	5.91
Within the past 2 yrs		73.75	91.96	94.09
Last mammogram	4,471			
>2 yrs or never		53.76	29.85	29.78
Within the past 2 yrs		46.24	70.15	70.22
Last pap smear	7,910			
>2 yrs or never		35.21	22.13	25.77
Within the past 2 yrs		64.79	77.86	74.23

[a]: Sample frequencies. There were 417, 884, and 421 individuals age 18 years or older who did not respond to the questions regarding flu shot, cholesterol check, and blood pressure check, respectively, and hence were excluded from the corresponding estimations. Mammogram question was prompted only to women aged 40 years or older. Women who did not respond to the questions regarding pap smears were excluded from the estimation of pap smear use.

[b]: Population proportions corresponding to the sample frequencies.

[c]: Regular site without a regular doctor.

found in the equations of pap smears or mammograms within the past two years.

As described before, the effects of having a regular doctor (I_d) and having a regular site (I_s) conditional on the choice of a usual source of care are $\gamma_1+(\alpha_d\lambda_d-\alpha_0\lambda_0)$ and $\gamma_2+(\alpha_s\lambda_s-\alpha_0\lambda_0)$, respectively. These two effects are show in Table 4. Marginal effects of having a regular doctor and a regular site on the probabilities of receiving preventive services were reported. The λ's were calculated for each individual based on the predicted probabilities from the first-stage estimation. Because the λ's vary by individuals, the averages of the λ's were used in calculating the marginal effects.

Table 3: Selected Results from the Second-Stage Estimations*

	γ_1	γ_2	α_0	α_d	α_s	*F test***
Blood pressure	0.319	−0.230	0.491[a]	0.286[c]	−0.186	12.82[a]
Cholesterol check	0.070	−0.611[b]	0.508[a]	0.259[c]	−0.344[c]	14.60[a]
Pap smear	0.475	0.087	−0.029	0.154	−0.303	0.42
Mammogram	0.744	0.090	0.043	0.359	−0.384	0.64
Flu shot	−0.042	−0.758[a]	0.342[a]	0.195	−0.509[b]	6.19[a]

*: Results from the estimation of

$$Y = X\beta + \gamma_1 I_d + \gamma_2 I_s + \alpha_0(1 - I_d - I_s)\lambda_0 + \alpha_d I_d \lambda_d + \alpha_s I_s \lambda_s + v$$

Y stands for the probability of receiving a preventive service within the past two years. I_d and I_s are the indicators of having a regular doctor and having a regular site, respectively. The λ's are the endogeneity correction terms. The coefficients of the predisposing, enabling, and need variables (X) are not reported. The full estimations are available upon request.

**: Joint test of $\alpha_0 = 0$, $\alpha_d = 0$, and $\alpha_s = 0$.

[a]: Significant at a 99% confidence level.

[b]: Significant at a 95% confidence level.

[c]: Significant at a 90% confidence level.

The most noticeable patterns in Table 4 are that, after controlling for endogeneity, (1) having a regular doctor has a greater impact on only two services than having a regular site and is as effective as having a regular site for the other three services, and (2) the magnitude of the impact of having a usual source of care differs by service. In descending order of the impact magnitude, having a regular doctor affected: cholesterol level checkups, pap smears, blood pressure checkups, flu shots, and mammograms. The ordered sequence for the impact magnitude of having a regular site was: pap smears, cholesterol level checkups, mammograms, blood pressure checkups, and flu shots. A regular doctor outperformed a regular site in ensuring that individuals have blood pressure and cholesterol level checkups. No significant differences were found in the effects of having a regular doctor and having a regular site on an individual's receiving flu shots, mammograms, and pap smears.

The fourth and fifth columns are the counterparts of columns one and two in single-equation estimations. For blood pressure and cholesterol level checkups, in which endogeneity of having a usual source of care was found, estimations without endogeneity control overestimated the relative effects of having a regular doctor to having a regular site. The comparative advantage of having a regular doctor (relative to having a regular site) estimated by the single-equation approach is shown in the last column of Table 4. Except for blood pressure and cholesterol level checkups, no significant differences were found in the effects of having a regular doctor and having a regular site.

Table 4: Marginal Effects of Having a Regular Doctor and Having a Regular Site on the Probability of Preventive Service Use*

	With Endogeneity Correction			*Without Endogeneity Correction*		
	RD	*RS*	*Diff. (RD vs. RS)*	*RD*	*RS*	*Diff. (RD vs. RS)*
Blood pressure check	0.118[a]	0.104[a]	0.013[b]	0.104[a]	0.089[a]	0.015[b]
Cholesterol level check	0.223[a]	0.196[a]	0.027[c]	0.196[a]	0.157[a]	0.038[a]
Pap smear	N/A	N/A	N/A	0.195[a]	0.203[a]	− 0.008
Mammogram	N/A	N/A	N/A	0.095[a]	0.114[a]	− 0.019
Flu shot	0.098[a]	0.104[a]	− 0.006	0.086[a]	0.081[a]	0.005

RD: Regular Doctor

RS: Regular Site

N/A: Because no endogeneity of having a usual source of care was found in these two services, hence single-equation estimations were unbiased and efficient, only comparisons based on the results from the single-equation estimations are provided as shown in the last three columns.

*: The comparison group is having no usual source of care. When the marginal effects of RD and RS on the probability of receiving a preventive service are calculated, other control variables were evaluated at their means.

[a]: Significant at a 99% confidence level.

[b]: Significant at a 95% confidence level.

[c]: Significant at a 90% confidence level.

DISCUSSION

The objective of this study was to test a hypothesis raised in the health services research literature that having a regular doctor may have a stronger effect than having a regular site in improving the timeliness and adequacy of receiving preventive services. This study revealed that the comparative advantage of having a regular doctor over having a regular site appeared in only blood pressure and cholesterol level checkups. In providing pap smears, mammograms, and flu shots, a regular site was found to be as effective as a regular doctor. The insignificant difference between the effects of a regular doctor and a regular site on the use of mammograms and pap smears may be the result of factors beyond a one-to-one patient–physician/site relationship. Schmittdiel et al. (1999) showed that only about 13.3 percent of women preferred their own primary care physicians for basic gynecology care in a large group model HMO in northern California. About 60.3 percent preferred a gynecologist to their primary care physicians. However, they also found that having seen a gynecologist for the last pelvic exam was the strongest predictor of preferring a gynecologist over a primary care physician. That is, the preference for a gynecologist was largely determined by previous experiences.

Blood pressure and cholesterol level checkups were more beneficial than the other three services in terms of clinically preventable burden (CPB). A recent study found that the CPBs of hypertension and cholesterol screenings were greater than 500,000 quality adjusted life years (QALYs) whereas the CPBs for cervical and breast cancer screenings and influenza immunization were much lower (Coffield et al. 2001). Consequently, a regular doctor, who has a closer relationship with a patient than physicians at a regular site, may have more motivation to provide the preventive services that would most benefit the patient when there are competing demands for multiple preventive services. This may be one possible reason for the observation of the comparative advantage of having a regular doctor over a regular site in providing blood pressure and cholesterol level checkups.

In addition, it is possible that the use of mammograms, pap smears, and flu shots is more likely to be determined by consumer characteristics than is the use of blood pressure and cholesterol checkups. For consumer-driven services, a regular doctor or site may not make any differences to the consumers, although both promote the use of these preventive services. It was shown that the level of insurance coverage for preventive care was a significant determinant of the timely receipt of preventive services (Faulkner and Schauffler 1997; Powell-Griner, Bolen, and Bland 1999). In particular, one study demonstrated that patients' cost-sharing had a negative impact on the use of mammograms and pap smears. However, this study found mixed results regarding blood pressure monitoring (Solanki and Schauffler 1999). That is, a patient may choose to forego mammograms or pap smears because of the lack of insurance coverage, but the lack of insurance coverage would not affect her use of blood pressure monitoring. Another piece of evidence found in the literature is that when providers are involved in promoting mammograms, intervention of telephone counseling does not increase the use of mammograms (Stoddard et al. 2002). It implies that consumers' financial and nonfinancial attributes are the principal determinants of the use of mammograms, regardless the providers' motivation.

In flu shots, intervention of sending patients reminder letters only increased the immunization rate by 2.7 percent, another indication that consumer attributes largely determine utilization (Terrell-Perica et al. 2001). In addition, flu shots can also be obtained through community health centers, pharmacies, and other nonmainstream sites. Thus, the contributions of a regular doctor and a regular site do not differ in affecting patients' receiving flu shots.

This study did not test how heterogeneity in the characteristics of sites affected prevention promotion. That is, whether mainstream sites such as a physician's office, physician's clinic, and HMO, were different from other sites, such as outpatient clinics and emergency rooms. Lambrew et al. (1996) found that the differences in the effects of having a regular physician and having a mainstream site were much smaller than all regular sites combined. They concluded that for chronic illness detection and management, there was no difference between the effects of having a regular doctor and having a regular mainstream site. Without separating the mainstream sites from the other sites, the results from this study may have underestimated the effects of having a mainstream site on various preventive services use and overestimated the effects of other sites.

If having a usual source of care is effective in promoting prevention in the population, consumers need to be encouraged to establish a stable relationship with primary care physicians. Data from the Community Tracking Study Household Survey (CTSHS), 1996–1997 (Center for Studying Health System Change), showed that about 42.5 percent of Americans were required to identify a primary care physician (PCP). There was evidence that if it was a requirement by an individual's insurance plan to have a PCP, a consumer often chose to identify a PCP in seeking care. Among individuals who were required by their insurance plans to have a usual source of care, about 7.5 percent did not choose to have a usual source of care. In contrast, the proportion almost doubled (13.8 percent) among those who were not required by insurance to sign up with a usual source of care. In addition, consumers' preferences for a stable patient–physician relationship may be more acute care oriented than prevention oriented. The reason that the majority of individuals (64.9 percent, estimated by CTSHS 1996–1997, and 66.9 percent, estimated by the MEPS 1996) did not have a usual source of care was that "there is no reason to have a usual source of care because I seldom or never get sick." Among the uninsured individuals, it may be even more difficult to establish a stable patient–physician relationship. Lack of insurance coverage, transportation problems, language barriers, and other socioeconomic disadvantages may significantly hinder consumers from identifying a PCP and maintain a stable relationship with the PCP.

The findings from this study also have implications for evaluating different models of preventive care delivery. First, if a care delivery model has a built-in incentive for stable provider–patient relationships, then such model has the potential to provide continuous and adequate preventive services. An example of such model is an HMO or a PPO. The gatekeeper system provides

incentives for the enrollees to form a long-term relationship with the gatekeeper. The potential benefits of having a regular provider in terms of providing continuous and adequate preventive services may outweigh the disadvantages caused by financial constraints within an HMO. In this context, the comprehensiveness of preventive services covered by an HMO is crucial in determining whether the potential benefits of having a regular provider can be realized.

Caution needs to be taken in interpreting the results obtained by this study. This study did not address whether providing the five preventive services at the frequency of every other year was clinically appropriate. The U.S. Preventive Services Task Force (1996) outlined guidelines for numerous preventive services. For example, for individuals aged 21 years and older, regardless of gender, blood pressure needs to be checked at the frequency of at least every other year. All sexually active women need to receive pap smears at least once every three years. Also, there is strong evidence that women aged 50–69 need to receive a mammogram every one to two years, but there is insufficient evidence to support such frequency for women in other age groups.

Other organizations have their own guidelines regarding various preventive services. For example, the National Nutrition Initiative (1998) recommends that blood pressure should be checked at each office visit. The National Heart, Lung and Blood Institute (1993) recommended that cholesterol level should be measured in all adults 20 years of age, whereas the U.S. Preventive Services Task Force (1996) recommends cholesterol level checkups only for men between 35 and 65 years old and women 45 and 65 years old. Individual clinics and provider networks, especially the HMOs, may also have their own guidelines. In short, there are no gold standards for either the target populations or the frequencies of tests/screenings. In addition, physicians' attitudes toward guidelines may vary significantly. A study by Inouye et al. (1998) found that physicians increasingly believed that clinical guidelines were being used for cost-containment purposes and less for quality improvement. It is likely, according to the conclusion of this study, that guidelines are totally ignored by some physicians.

One methodological limitation of the current study is that excluding the identifying variables from the second-stage estimation may not be appropriate and the choice of the identifying variables may be critical in producing robust results. Without proper identifying variables, the estimation would have to rely on the untestable joint distribution of the error terms and is susceptible to collinearity in the second stage estimation. Readers need to bear in mind this

methodological limitation when interpreting the results. Future studies should attempt to find better identifying variables that affect the choice of a usual source of care but not the use of prevention, and to use applicable models that are more robust to different specifications. Also, the current study may suffer from the assumption that overutilization of preventive services is better than underutilization. Further research focusing on a particular subpopulation or specific preventive services can further our understanding of whether having a usual source of care, especially a regular doctor, results in appropriate clinical prevention.

NOTES

* In this study, the difference in the effects of having a regular doctor and having a regular site was computed as $\gamma_1+(\alpha_d\lambda_d-\alpha_0\lambda_0)-\{\gamma_2+(\alpha_s\lambda_s-\alpha_0\lambda_0)\}$. That is, the difference in the conditional means. Other researchers may prefer the difference in the unconditional means, $\gamma_1-\gamma_2$. Although the estimations are the same, the interpretations are different. When unconditional means are used, $\gamma_1-\gamma_2$ is interpreted as the difference in the effects of having a regular doctor and having a regular site had there been no selection. In contrast, if conditional means are used, $\gamma_1+(\alpha_d\lambda_d-\alpha_0\lambda_0)-\{\gamma_2+(\alpha_s\lambda_s-\alpha_0\lambda_0)\}$ is interpreted as the difference in the effects of having a regular doctor and having a regular site had a regular doctor been chosen over a regular site. Readers who are interested in the difference in unconditional means can consult Table 3 to easily obtain $\gamma_1-\gamma_2$.

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