

Adherence of Low-income Women to Cancer Screening Recommendations

The Roles of Primary Care, Health Insurance, and HMOs

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BACKGROUND: African-American and low-income women have lower rates of cancer screening and higher rates of late-stage disease than do their counterparts.

OBJECTIVE: To examine the effects of primary care, health insurance, and HMO participation on adherence to regular breast, cervical, and colorectal cancer screening.

DESIGN: Random-digit-dial and targeted household telephone survey of a population-based sample.

SETTING: Washington, D.C. census tracts with $\geq 30\%$ of households below 200% of federal poverty threshold.

PARTICIPANTS: Included in the survey were 1,205 women over age 40, 82% of whom were African American.

MAIN OUTCOME MEASURES: Adherence was defined as reported receipt of the last 2 screening tests within recommended intervals for age.

RESULTS: The survey completion rate was 85%. Overall, 75% of respondents were adherent to regular Pap smears, 66% to clinical breast exams, 65% to mammography, and 29% to fecal occult blood test recommendations. Continuity with a single primary care practitioner, comprehensive service delivery, and higher patient satisfaction with the relationships with primary care practitioners were associated with higher adherence across the 4 screening tests, after considering other factors. Coordination of care also was associated with screening adherence for women age 65 and over, but not for the younger women. Compared with counterparts in non-HMO plans, women enrolled in health maintenance organizations were also more likely to be adherent to regular screening (e.g., Pap, odds ratio [OR] 1.89, 95% confidence interval [CI] 1.11 to 3.17; clinical breast exam, OR 2.04, 95% CI 1.21 to 3.44; mammogram, OR 1.95, 95% CI 1.15 to 3.31; fecal occult blood test, OR 1.70, 95% CI 1.01 to 2.83.)

CONCLUSIONS: Organizing healthcare services to promote continuity with a specific primary care clinician, a comprehensive array of services available at the primary care delivery site, coordination among providers, and better patient-practitioner relationships are likely to improve inner-

city, low-income women's adherence to cancer screening recommendations.

KEY WORDS: breast, cervical, and colorectal neoplasm/prevention and control; primary health care; poverty; insurance; women; ethnicity/black/ African American.

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Low-income women have disproportionate breast, cervical, and colorectal cancer morbidity and mortality.¹⁻⁷ African Americans are disproportionately represented among women with low incomes. A large portion of the income- and race-associated cancer morbidity and mortality is related to lower use of regular cancer screening.⁶⁻¹¹ This differential in screening adherence persists despite evidence that regular screening reduces mortality from 30% to 70%.¹²⁻¹⁹ While "ever" and "recent" screening rates are increasing for all groups,²⁰⁻²² fewer data are available on factors associated with adherence to recommended¹⁸ use of regular screening, especially for low-income and minority women.²³⁻³²

Having a regular source of care²⁴⁻²⁹ or a physician recommendation for screening³⁰⁻³² are two of the most consistent predictors of cancer screening among women of all income and demographic groups. If this "usual source of care" is a primary care site, then a "recent" cancer screening test is more likely to have occurred.^{28,29} However, among those studies that assessed whether the woman had "a usual source of care," most did not measure specific characteristics of primary care provider settings,³³ where screening is most often initiated. The studies that focused on the process and structure of primary care^{28,29} did not concurrently measure patient attitudes and beliefs with respect to screening utilization, and target lower income persons.³⁴⁻³⁷

We examined the effects of primary care and health insurance, including enrollment in health maintenance organizations, on adherence to breast (clinical breast exams and mammograms), cervical (Pap test), and colorectal (fecal occult blood test) cancer screening over time among a population-based sample of women living in low-income urban census tracts. We hypothesized that women with better primary care delivery sites, defined as care that is continuous, comprehensive, accessible, coordinated, and involving a strong patient-clinician relationship, would have higher rates of adherence to cancer screening, even in the face of strong socioeconomic, insurance and cultural belief barriers to screening.

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METHODS

Survey Design and Sampling

Sampling Strategy. Inclusion criteria were being female, age over 40 years, residing in a Washington, D.C. census tract with at least 30% of households having an income $\leq 200\%$ of the 1999 poverty threshold for a family of four.³⁸ The target sample size was 1,200. Our strategy balanced efficiency with a community-based sampling method. A professional sampling system (Genesys Sampling Systems, Marketing Systems Group, Fort Washington, Pa) generated a list of telephone numbers to obtain a sample of 25% random-digit-dial and 75% targeted listed households. The random-digit dialing sample was generated from the set of all telephone exchanges that service the lower income census tracts throughout Washington, D.C. To oversample women with low incomes, the listed household sample was merged with demographic information from census and marketing data, which targeted inclusion criteria.

While controversy exists over screening women over age 65 with Pap smears and women under age 50 with mammograms, we chose to include these age groups in order to examine whether associations between primary care, insurance variables, and screening were present for them as well.

Instrument Development and Data Collection. The telephone survey was developed using focus groups, prior research,^{24,39-44} and pilot testing. Trained, female bilingual (Spanish/English) interviewers conducted a computer-assisted telephone survey between January and March 2000. An original and up to 5 call-backs were attempted to reach each residence. Most calls were made between the hours of 3pm and 10pm on weekdays and weekends, but calls were also made outside of these hours and a toll-free number was provided. The survey took on average 25 minutes to complete. The completion rate was 85%, defined as the proportion of eligible women contacted who consented to and completed the survey.

Variables

Our dependent variables were adherence to cervical, breast, and colorectal cancer screening. For each test, adherence was defined as self-reported receipt of a "recent" and routine age-appropriate screening test, plus receipt of a test just prior to that most recent test during the recommended interval.^{18,45} For Pap smears, we used receipt of a recent Pap in the past 3 years, and a Pap during the 3 years prior to the most recent. For clinical breast exam (CBE), we used a recent CBE in the past year plus a CBE during the 2 years prior to this most recent CBE. For mammogram, we used a recent and routine mammogram in the past 2 years, plus a mammogram during the 2 years prior to this most recent one. For adherence to the fecal occult blood test (FOBT), we used a recent FOBT in the past year plus an

FOBT during the 2 years prior to the most recent one, for women over age 52. Since screening rates with flexible sigmoidoscopy are so low in the population of interest, and because many ambulatory settings serving these women did not have these capabilities at the time of the study, this test was not measured.

Independent variables were age (41-49, 50-64, ≥ 65 years), household income, race/ethnicity, education, work status, marital status, family size, whether one owns/rents home, health status, cancer knowledge/attitudes and beliefs,⁴¹⁻⁴⁴ insurance status and plan type, features of primary care and the patient-clinician relationship.⁴⁰ The items on cancer attitudes and beliefs were those found in prior studies to be most strongly associated with late-stage diagnosis of cancer or with screening in similar populations^{42,44} (instrument available from authors). We employed the Institute of Medicine's definition of primary care as "the provision of integrated, accessible health care services by clinicians that are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community."⁴⁶ Primary care key features measured were comprehensive service delivery, coordination, continuity with a single provider, accessibility,⁴²⁻⁴⁷ and the patient-clinician relationship. We adapted the Primary Care Assessment Survey to develop the primary care variables.⁴⁰ A summary of the items measuring the primary care features may be found in Appendix A.

The visit continuity variable was created to have 4 mutually exclusive categories: 1) no usual site of care, 2) having a usual site but no regular clinician at that site (reference group), 3) having a usual site and a regular clinician at that site whom one saw for only some sick and well visits, 4) having a usual site and a regular clinician whom one saw for most sick and well visits. To create these last 2 categories, survey items asked: "When you go for a check-up or routine care, how often do you see your regular doctor as opposed to an assistant or partner?" and "When you are sick and go to the doctor, how often do you see your regular doctor as opposed to an assistant or partner?" Response options were: almost always, a lot of the time, some of the time, almost never, and never. If a woman had a regular clinician at her usual site of care and if she answered "almost always" to these last 2 questions, she was put in the group with the highest level of visit continuity.

Data Analysis

Univariate, bivariate, and stratified analyses with χ^2 tests were done prior to multivariate modeling. To analyze our measures of screening adherence, we created a dichotomous outcome variable (adherent vs nonadherent). We assessed for confounding. We also assessed for interaction between insurance, income, health status, and each of the primary care variables separately with respect to receipt of each screening test.

Logistic regression models were then built. Socio-economic, demographic, and cancer attitudes and beliefs variables were added first to control for women's propensity to obtain screening services. Additional groups of variables were added in a stepwise fashion to examine their impact on adherence controlling for propensity of women to obtain screening services. Specifically, we added the primary care variables next, followed by the insurance and HMO variables. This sequence was chosen to determine if insurance and use of HMOs increased the explanatory power of the model, once primary care delivery factors were controlled. Final models were based on variables that had an association ($P \leq .20$)⁴⁸ with screening adherence in stepwise logistic regressions or that were associated with screening in univariate analyses or in prior literature. Since comprehensiveness of noncancer screening services was so likely to overlap conceptually with cancer screening, this construct was not included in the logistic regression models.

Because women age 65 and over are likely to have Medicare, with implications for coverage of screening and other services, all multivariate models were run both for the entire group combined, and then separately for women <65 and women ≥ 65 . Model fits were good as assessed by the Hosmer-Lemeshow test and c statistic.^{48,49} We also calculated the population attributable risk to assess the association between significant primary care variables and screening.^{50,51} Prior to calculating attributable risk, we modeled the dependent variable of non-adherence in order to permit a more intuitive and meaningful interpretation of the population attributable risk estimate.

RESULTS

Table 1 describes the sample. For comparison, we used the 1999 Current Population Survey⁵² (CPS) data for Washington, D.C. to describe the universe of women over age 40 living in the census tracts sampled. Compared with the CPS estimates, the study population was older, had less formal education, was poorer, and was more likely to be African American. This reflects success in targeting a large subgroup of low-income women.

Study population rates of uninsurance for women age 41 to 64 (13.2%) were slightly higher than national rates (7%) for the same age group.¹⁰ Seven percent of those with a regular clinician identified an obstetrician-gynecologist as that clinician. The majority of respondents (62%) used private doctors' offices or an HMO. Twenty-seven percent attended community health centers or other non-profit community health clinics.

Only 1 of the cancer attitude and belief items was consistently associated with adherence across all 4 cancer screening tests: "Going to the doctor for check-ups when well" ($P \leq .01$). None of these attitude or

belief items were consistently associated with screening adherence in the logistic regression models (see Tables 3 and 4).

Overall, 75% of respondents were adherent to regular Pap smears, 66% to clinical breast exams, 65% to mammography, and 29% to fecal occult blood test recommendations. Table 2 presents the unadjusted percentages of women adherent to screening recommendations according to respondents' primary care and insurance characteristics. Continuity of care was significantly associated with adherence to all 4 screening tests. For each test, the largest increase in adherence was found for those who had a usual source of primary care compared with those without one. However, there were also increases in screening adherence among the younger women (Table 3) who had a specific practitioner whom they saw for most visits at their primary care delivery site, compared with those without a specific practitioner. Likewise, longer relationships with primary care practitioners were significantly associated with higher proportions of women adherent to screening recommendations (Table 2). Respondents with more "comprehensive" primary care sites in terms of noncancer counseling, screening, and general health services were more likely to be adherent to all cancer screening tests.

Logistic Regression Analyses

Tables 3 and 4 present the adjusted odds ratios from the logistic regression models done separately for women age <65 and ≥ 65 . For women under age 65, continuity with a place and with a specific clinician was associated ($P \leq .01$) with screening adherence for Pap tests, CBEs, and mammograms. For women ≥ 65 , continuity of place was associated with adherence to Pap tests, CBEs, and mammograms. Respondents whose primary care delivery sites were more "comprehensive" were more likely to be adherent with recommended Pap tests and CBEs if aged <65 years, and with all 4 tests if ≥ 65 years. Better coordination of specialist care outside of the office was also associated with CBEs, mammograms and FOBT adherence among older women. The lack of association between coordination of specialty care and screening adherence among younger women was probably due to their better self-assessed health status and lower use specialists or of hospitalized care compared with older women's, and thus to their less-frequent responses to the items on coordination of care.

Although having any private insurance was significantly associated with adherent screening in the unadjusted analyses, once the primary care variables were entered into the models, only 1 of the insurance categories, i.e., private HMO, remained significant. Since we were interested in further exploring whether the higher adherence to cancer screening among private HMO enrollees was

Table 1. Characteristics of the Study Sample (N = 1,205) Compared with Women Living in the Same Census Tracts*

Characteristic	Study Population (N = 1,205)	Women in Same Census Tracts as the Study Population
Mean age, y	64.8	59.7
41-49, %	16.3	25.5
50-65, %	28.4	38.7
≥65, %	55.3	35.8
Education (highest completed), %		
<12 years	26.3	21.8
High school grad/GED	33.5	27.7
≥Some college	40.2	50.5
Income, %		
Don't know/refused (most similar to the <\$10K group)	26.9	
<\$10K	11.5	11.5
\$10-20K	15.9	14.4
\$20-30K	15.1	17.0
\$30-40K	11.4	10.3
\$>40K	19.2	46.8
Self-identified ethnicity/race, %		
Black/African American	82.7	67.0
Caucasian	6.6	25.9
Hispanic/other	3.7	7.1
Refused	7.0	
Owns home (vs rents), %	66.2	63.5
Work status, %		
Retired/disabled	62.6	30.7
Working full-time	24.3	41.1
Working part-time	6.4	9.1
Unemployed/homemaker/student/refused	7.2	19.1
Married/living as married, %	26.5	37.4
Mean family size	2.1	2.3
≥4 Persons/household, %	12.4	15.6
Health status (self-assessed), %		NA
Poor-fair	26.2	
Good	36.4	
Very good-excellent	37.4	
Has a regular personal doctor/nurse, %	84.8	NA
Health insurance for any period during the past 12 mo, %		NA
Public only	22.8	
Private (may also have had Medicare/Medicaid)	67.9	
Uninsured for the entire past 12 mo		
<65 years old	13.2	
≥65 years old	6.3	

* Census tracts where at least one third of the population lives at or below 200% poverty threshold.

D.C. Current Population Survey, 1999 for Women over age 40 in the same census tracts. Note: CPS presents rates for all ages combined (uninsured not available from CPS stratified by these age categories).

NA, not available.

associated with the primary care performance of those arrangements, we compared women's reports of primary care performance across insurance and plan types. Women in private HMOs (<65 years old) and Medicare HMOs (≥65 years old) had lower ratings of their primary care characteristics than did women in private indemnity plans. For example, 37.6% of women in HMOs rated their continuity as highest whereas 64.3% of women in private indemnity plans rated their continuity as highest ($P = .001$). Only 51.9% of women in HMOs rated their sites' organizational accessibility as highest versus 66.9% of women in private indemnity plans ($P = .001$). Similar differences existed for the other characteristics of primary care: trust in the regular physician (60.5% HMO vs 77.5% private fee-for-service [FFS]), coordination of specialty care (27.4% HMO vs 41.4% private FFS), and comprehensiveness of services (42% HMO vs 55% in private FFS) ($P = .001$ for each comparison).

Finally, we re-ran the final logistic regression models to examine whether there were differences for women whose regular clinician was an obstetrician-gynecologist versus other type of clinician. Inclusion of this covariate did not change the relationships between the primary care variables and screening adherence.

DISCUSSION

This study is the first to examine the role of specific characteristics of primary care delivery in adherence to cancer screening while incorporating a rich array of attitudinal, socioeconomic, and insurance barriers to screening for a population-based sample of inner-city, mostly low-income women. Despite numerous barriers, women with primary care delivery sites characterized by more continuity of care, comprehensive services, and coordination were more adherent to regular cancer

Table 2. Screening Adherence by Features of the Primary Care Delivery Site, Insurance, and HMO Participation

	Women, n	Pap Test, %	CBE, %	Mammogram, %	FOBT,* %
Features of the primary care delivery site					
Visit continuity with a primary care delivery site and clinician					
No site of care	34	41.2 [†]	23.5 [†]	29.4 [†]	11.5 [†]
Has a site of care but no regular clinician	149	68.5 [†]	60.4 [†]	53.0 [†]	24.3 [‡]
Has primary care site and regular clinician but sees for only some visits	391	76.9 [†]	64.7 [†]	66.5 [†]	33.3 [‡]
Has primary care site and sees same regular clinician for most visits	631	76.7 [†]	71.5 [†]	69.7 [†]	28.9 [‡]
Duration of the relationship					
Has had primary care delivery site for <6 mo	71	61.9 [†]	57.7 [‡]	50.7 [†]	21.0 [‡]
Has had same primary care site for 6–24 mo	273	73.6 [†]	64.8 [‡]	63.4 [†]	26.3 [‡]
Has had same primary care site for >24 mo	826	77.7 [†]	69.7 [‡]	69.0 [†]	31.9 [‡]
Access, organizational					
Lower	531	71.2 [†]	63.5 [‡]	64.6	29.1
Higher	674	77.6 [†]	69.0 [‡]	66.2	29.6
Access, geographic					
Lower	588	73.5	63.9 [‡]	62.1 [†]	27.9
Higher	598	76.9	69.2 [‡]	69.4 [†]	31.0
Access, financial					
Lower	308	70.8 [†]	63.3 [‡]	62.7	29.1
Higher	692	78.7 [†]	70.6 [‡]	66.9	30.0
Don't know/missing	205				
Comprehensiveness, all health needs met by regular provider					
Lower	591	72.6 [‡]	63.6 [†]	62.6 [‡]	25.9 [‡]
Higher	575	78.3 [‡]	71.0 [†]	69.4 [‡]	32.8 [‡]
Comprehensiveness, of non-cancer screening tests					
Lower	190	55.8 [†]	40.5 [†]	47.4 [†]	13.8 [†]
Higher	1,007	78.9 [†]	72.0 [†]	69.4 [†]	32.2 [†]
Comprehensiveness, counseling around diet, alcohol and tobacco					
Lower	369	65.6 [†]	58.5 [†]	60.4 [†]	25.3 [‡]
Higher	831	79.0 [†]	70.4 [†]	68.1 [†]	31.5 [‡]
Patient-physician relationship, compassion					
Lower	648	70.0 [†]	62.0 [†]	61.6 [†]	26.7 [‡]
Higher	557	80.0 [†]	71.8 [†]	70.0 [†]	32.5 [‡]
Patient-physician relationship, trust					
Lower	321	72.6	62.0 [†]	63.8	25.2
Higher	871	75.9	68.3 [‡]	66.5	30.9
Patient-physician relationship, communication					
Lower	555	70.6 [†]	62.9 [†]	63.1	28.2
Higher	635	79.2 [†]	70.2 [†]	68.4	31.1
Coordination of specialist care (n = 748)					
Low	133	75.9	63.2 [†]	63.2	20.0 [†]
Mid	354	79.7	69.2 [†]	71.7	32.7 [†]
High	267	80.9	77.9 [†]	70.4	37.4 [†]
Health system/insurance status					
<65 years old					
Uninsured	70	71.4 [†]	61.4 [†]	50.0 [†]	10.0 [†]
Public only (Medicaid [§] and/or Medicare only)	88	78.4 [†]	63.6 [†]	43.2 [†]	26.5 [†]
Private HMO	145	90.3 [†]	75.8 [†]	80.0 [†]	43.4 [†]
Other private (may have public too)	229	84.7 [†]	78.6 [†]	65.9 [†]	23.6 [†]
≥65 years old					
Uninsured	41	60.9 [†]	58.5 [‡]	53.7 [†]	17.1 [†]
Original Medicare (may have Medicaid too)	210	60.0 [†]	55.2 [‡]	59.0 [†]	25.7 [†]
Medicare managed care	117	74.3 [†]	70.9 [‡]	75.2 [†]	39.3 [†]
Medicare + private Medigap	295	72.5 [†]	61.7 [‡]	70.5 [†]	31.9 [†]

* For FOBT, n = 990 since adherence to FOBT only applies to women age ≥52 (allows for woman ≥50 to have their first FOBT).

[†] P ≤ .01.

[‡] P < .05.

[§] Includes Medicaid managed care enrollees.

^{||} "Other private" includes Federal Employees Health Benefits Program (FEHBP), Champus and other plans.

Adherence is defined for each screening test as having obtained the last two tests within age-appropriate intervals based on National Cancer Institute, American Cancer Society, and United States Preventive Services Task Force guidelines; e.g., mammogram adherence, last mammogram was for a routine screening exam, was within the past 2 years, and also had a mammogram during the immediate 2 years before that "recent" one. CBE, clinical breast exam; FOBT, fecal occult blood test.

Table 3. Factors Significantly Associated with Adherence to Cancer Screening Recommendations for Women <65 Years Old (N = 539) Living in Lower-income Census Tracts of Washington, D.C. 2000

Significant Factors	Adherence to Screening-adjusted OR* (95% CI)			
	Pap Test	Clinical Breast Exam	Mammogram	FOBT†
Patient characteristics				
Knowledge/attitudes/beliefs‡				
Avoid doctor even if sick		0.56§ (0.34 to 0.91)	0.61§ (0.37 to 1.00)	
Demographic and socioeconomic				
Age (50–64 vs the 40–49 reference group)			2.14 (1.43 to 3.20)	
Income higher (vs lower, reference group)	3.10 (1.59 to 5.98)		1.78§ (1.10 to 3.16)	
Owens home (vs rents, reference group)	1.95§ (1.12 to 3.41)			
Education higher (vs lower reference group)		2.0 (1.16 to 3.52)	2.68 (1.58 to 4.58)	
African American (vs caucasian reference)				3.15 (1.37 to 7.21)
Primary care attainment				
Visit continuity				
No site of care	0.42 (0.12 to 1.45)	0.19 (0.05 to 0.69)	0.24§ (0.06 to 0.96)	¶
Has a site, but no regular clinician	REF	REF	REF	
Has site and regular clinician for some visits	2.66 (1.29 to 5.52)	1.30 (0.67 to 2.23)	1.49 (0.82 to 2.71)	
Has site and sees regular clinician most visits	3.54 (1.69 to 7.40)	1.82§ (1.10 to 3.28)	2.10 (1.17 to 3.74)	
Comprehensiveness, all needs met				
Lower		REF		
Higher		0.43§ (0.19 to 0.98)		
Comprehensiveness, counseling				
Lower	REF	REF		
Higher	2.70 (1.50 to 4.83)	2.17 (1.21 to 3.88)		
Patient-physician relationship, compassion				
Lower				REF
Higher				2.91§ (1.10 to 7.78)
Patient-physician relationship, trust				
Lower	REF			
Higher	3.11 (1.30 to 7.43)			
Health insurance and plan type				
Uninsured			REF	REF
Public only			0.63 (0.31 to 1.28)	2.24 (0.64 to 7.89)
Private HMO			2.29 (1.14 to 4.57)	6.39 (2.05 to 19.90)
Private non-HMO			1.00 (0.54 to 1.86)	2.22 (0.73 to 6.78)

* All odds ratios are adjusted for attitudes, beliefs, knowledge regarding cancer, insurance, age, income, home ownership, education, race/ethnicity, marital and health status, all features of primary care: continuity, accessibility, comprehensiveness, coordination, and the patient-provider relationship (compassion, communication, and trust aspects), and insurance and health plan type.

† FOBT adherence only applies to women over age 52.

‡ Reference group is the absence of this belief or attitude.

§ P < .05.

|| P ≤ .01.

¶ Underpowered for this particular comparison in this age group of 52–64.

FOBT, fecal occult blood test; REF, reference group.

screening. Finally, being in a private HMO was the only insurance category significantly associated with screening adherence after controlling for the primary care characteristics of women's delivery sites.

Additionally, higher levels of patient-clinician trust, compassion, and communication were associated with adherence to cancer screening for certain screening tests.

It is possible that the 2 tests not done in the office, mammograms and FOBTs, might be associated with communication, but because they require an additional step for utilization (outside referral to a mammogram facility; and return of test cards for a home FOBT), they are more complicated than tests completely performed in the primary care office. Hence this added step may mediate

Table 4. Factors Significantly Associated with Adherence to Cancer Screening Recommendations for Women ≥ 65 Years Old (N = 666) Living in Low-income Census Tracts of Washington, D.C. 2000

Significant Factors	Adherence to Screening OR* (95% CI)			
	Pap Test	Clinical Breast Exam	Mammogram	FOBT [†]
Patient characteristics				
Knowledge/attitudes/beliefs [‡]				
Surgery causes faster growth	0.59 [§] (0.40 to 0.86)			
Prayer alone heals cancer		0.67 (0.47 to 0.95)		
Demographic and socioeconomic				
Owns home (vs rents reference group)		1.61 [§] (1.10 to 2.34)	1.58 (1.09 to 2.31)	
Education (higher vs lower reference group)			1.48 (1.02 to 2.17)	1.64 (1.02 to 2.64)
Marital status (vs single reference group)	1.60 (1.02 to 2.49)			
Primary care attainment				
Visit continuity				
No site of care	0.32 (0.14 to 0.93)	0.19 [§] (0.05 to 0.68)	0.34 (0.13 to 0.90)	
Has site but no regular clinician	REF	REF	REF	REF
Has site and regular clinician, sees some visits	0.94 (0.50 to 1.74)	0.97 (0.54 to 1.76)	1.38 (0.76 to 2.49)	
Has site and regular clinician, sees most visits	0.76 (0.42 to 1.38)	1.22 (0.69 to 2.16)	1.38 (0.78 to 2.42)	
Comprehensive, counseling				
Lower	REF	REF	REF	REF
Higher	1.68 (1.01 to 2.82)	1.46 (1.01 to 2.12)	1.53 [§] (1.09 to 2.15)	1.90 [§] (1.15 to 3.13)
Patient-physician relationship, communication				
Lower	REF			
Higher	2.37 [§] (1.31 to 4.28)			
Coordination of specialist care (n = 748)				
Low		REF	REF	REF
Mid		1.47 (1.00 to 2.17)	1.63 (1.09 to 2.44)	1.27 (0.84 to 1.93)
High		2.36 [§] (1.44 to 3.87)	1.78 [§] (1.11 to 2.85)	1.78 [§] (1.13 to 2.82)
Health insurance and plan type				
Uninsured	1.37 (0.66 to 2.87)	1.75 (0.83 to 3.71)	1.15 (0.56 to 2.35)	0.68 (0.28 to 1.69)
Original Medicare (may have Medicaid too)	REF	REF	REF	REF
Medicare managed care	1.89 [§] (1.11 to 3.17)	2.04 [§] (1.21 to 3.44)	1.95 [§] (1.15 to 3.31)	1.70 (1.01 to 2.83)
Medicare plus private Medigap	1.53 (1.00 to 2.31)	0.89 (0.60 to 1.32)	1.25 (0.83 to 1.87)	1.15 (0.75 to 1.77)

* All odds ratios are adjusted for attitudes, beliefs, knowledge regarding cancer, insurance, age, socioeconomic status, income, home ownership, education, race/ethnicity, marital and health status, all features of primary care: continuity, accessibility, comprehensiveness, coordination, and the patient-provider relationship (compassion, communication, and trust aspects), and insurance and health plan type.

[†] FOBT adherence only applies to women over age 52.

[‡] Reference group is the absence of this belief or attitude.

[§] P < .01.

^{||} P < .05.

FOBT, fecal occult blood test; REF, reference group.

the impact of communication on utilization for mammograms and FOBT. The answer to this question requires additional research.

While insurance was associated with screening adherence in unadjusted analyses, after controlling for primary care characteristics, being in a private HMO was the only insurance category that remained significant. Unlike the other insurance categories, the HMO category encompasses both insurance coverage and structural aspects of that subgroups' health care. Women in private HMOs and Medicare HMOs rated those sites significantly poorer on primary care performance (accessibility, continuity, com-

prehensiveness, coordination, patient-physician relationship) than did women in private indemnity plans. So, it is unlikely that the higher cancer screening rates among HMO participants were due to stronger primary care performance by those settings. One might speculate that women in HMOs were more likely to be adherent to screening than were women in nonHMOs because of participation by managed care plans in the Health Plan and Employer Data Information Set (HEDIS 3.0 and HEDIS 1999-2000 Reporting Sets; Washington, D.C.; National Committee for Quality Assurance) provides them incentives to emphasize cancer screening. This finding that HMOs

perform well on the delivery of cancer screening services is supported by other studies.^{53,54}

In conjunction with the primary care findings of this study, the additional finding on insurance suggests several things about its relationship to cancer screening. Having insurance, in general, is an important facilitator of entry into healthcare. However, it seems that the characteristics—i.e., structure and process—of a woman's primary care delivery system are also important for assuring adherence to screening for low-income women. Among the primary care characteristics, continuity of care appears to have an impact on cancer screening adherence. Overall, this study adds to the growing literature suggesting that delivery system characteristics, in addition to the presence of insurance, are associated with preventive services use.^{27,55}

For women over 65, we did not find that financial accessibility of primary care, measured in this study as the perception of out-of-pocket costs for physician visits, prescriptions, and prescribed treatments, influenced screening utilization. Prior research found that lower cost-sharing is associated with greater use of preventive services.⁵⁶ However, state medical assistance, via the Qualified Medicare Beneficiary Program and the Specified Low-Income Medicare Beneficiary Program, helps low-income women with Medicare Part B premiums, deductibles, and coinsurance.⁵⁷ For women under 65, the National Breast and Cervical Cancer Early Detection Program's coverage of cervical and breast cancer screening for qualified women was probably an important contributor⁵⁸ to the absence of an association between perceived financial access and screening.

Because this study identified women randomly in the community, rather than using a convenience sample of clinic attendees, it has public health policy relevance, because it focuses on all women, not just those attending medical clinics or offices. This study also has limitations. These data may not generalize to persons without telephones or in rural areas. It is estimated that 94% of African-American households in the District of Columbia have phones.⁵⁹ The cross-sectional design limits interpretation of the directionality between independent variables and screening utilization. For example, women with a more recent CBE may be more likely to report having a more continuous relationship with a provider. However, prior work has found a potentially causal relationship between having a usual source of care and the receipt of screening services.²⁷ In addition, the exposure-response relationship between some of the primary care variables and adherence provides further support for a potentially causal association.

Although widely used and informative, self-report data generally overestimate screening rates.^{60,61} We did not do a medical record validation of women's self-reported screening utilization because women received care at various different sites throughout the District of Columbia and it was not possible to do such a widespread medical record

validation. Because urban and especially lower-income populations are mobile, women who received tests at various facilities may be undercounted or underrepresented in a primary care medical chart validation.⁶² Characteristics that might influence self-report validity, such as education and socioeconomic status, were controlled for in analyses. Furthermore, the purpose of our study was not to validate screening rates, but to assess associations between primary care and self-reported screening. For a self-report bias to be operative, it needs to be unequally distributed among primary care groups. Although we think that this is unlikely,⁶³ we cannot rule out the possibility that women with a regular provider might be more likely to report adherence out of loyalty to that doctor.

The rates of screening adherence (last 2 tests at recommended intervals for age) for our entire sample were appropriately lower than rates of recent screening from a Behavioral Risk Factor Surveillance System (BRFSS) sample of women over age 40 in Washington, D.C. For example, rates of a "recent" mammogram (1 mammogram in the past 2 years) in the BRFSS for women over age 40 were about 85%. The overall rate of mammography adherence in our sample was 65.5%. Because we asked about not just the most recent mammogram but also the one prior to the most recent (adherence) we expected our percentages for mammography adherence to be somewhat lower, and they were. Similarly reassuring comparisons can be made for the other tests between our data and BRFSS data for women in Washington, D.C.⁶⁴

The validity of respondents' classification of their insurance status also cannot be ascertained. The percentage of our sample aged ≥ 65 with Medicare managed care (17.6%) was higher than among all women age ≥ 65 in Washington, D.C. (10.4%).⁶⁵ This probably reflects the fact that Medicare managed care plans primarily serve urban seniors with incomes under \$20,000,⁶⁶ a group targeted by our sampling strategy.

We did not determine the proportion of our sample receiving care from both a primary care clinician and a gynecologist, the so-called 'dual PCP' arrangement. The likelihood of obtaining screening tests might increase among those with both types of clinicians, while continuity of care would decrease because of the need to see multiple providers for primary care. Nationally, about one third of women over age 18 receive care from both a gynecologist and a primary care provider.⁶⁷ This percentage is likely to be much lower in older, lower income women in medically underserved areas.^{67,68} Finally, while the sample size of this study was adequate to detect subgroup differences in receipt of Pap smears, CBEs, and mammograms, we lacked power to fully assess all relationships between the independent variables of interest and FOBT.

Implications

An important association in our study was between continuity with a specific primary care clinician and cancer

screening adherence. We calculated attributable risks to provide measures of the maximum amount that screening adherence could change if nonelderly women without a specific primary care clinician were linked to a specific clinician at their primary care delivery sites. Our findings revealed that if there were a causal association between continuity and screening, Pap smear adherence would increase by 30%, CBE by 15% and mammography by 12% among women without a primary care clinician. These are the maximum effects potentially attainable by reorganizing primary care services to promote continuity for inner-city, low-income women. Clearly continuity is not the only factor related to screening adherence. But our results indicate that there are potentially clinically meaningful effects of continuity. Future research needs to determine, through longitudinal observation studies or controlled clinical trials, the extent to which continuity impacts on screening adherence.

Although progress has been made in narrowing the gap in screening rates between minority and nonminority populations, barriers to screening persist even among the insured. Assessment of the relationship between mutable features of primary care that promote ongoing screening will help to target intervention efforts. For example, not all insured persons have their cancer screening coordinated through a primary care provider. Some obtain screening in mass screening programs but fail to obtain coordinated follow-up and repeat screening. The relationships found in this study between continuity of care and adherence to screening over time suggest that absence of such primary care features in screening programs may result in poorer adherence. Health care education aimed at patients should stress the importance of identifying a primary care provider and of obtaining screening through that provider.

Another implication of our study is that efforts to eliminate the disparities in late-stage cancer among lower income and minority women might focus on developing performance assessment tools to include process indicators of the quality of primary care delivery, (e.g., continuity of care, comprehensive service delivery). Disease-specific performance measures do not create adequate incentive among health plans to deliver "optimal" primary care to their members.

Our results also suggest that efforts to decrease the disparity in potentially avoidable cancer morbidity and mortality among low-income women should take a broad perspective of their health care systems. Cancer screening needs to be considered in the context of the totality of a woman's health care needs and in the context of the practitioner with whom she has an ongoing relationship. Regardless of the barriers women face to screening, specific features of primary care delivery are associated with adherence to screening for this at-risk group. Thus, providing health insurance is a necessary but not sufficient step toward improving adherence to recommended cancer screening services. Efforts to improve screening adherence via increased insurance coverage

must be accompanied by additional research on the effectiveness of increasing primary care attainment among lower-income women.

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APPENDIX A

Brief Summary of the Items Measuring Primary Care Features

Continuity of care

Continuity of visits with a single provider

- Is there one particular place that you go to if you are sick or need advice about your health?
- Is there a place where you go most often if you are sick or need advice about your health?
- Do you have one person you think of as your personal doctor or nurse?
- When you go for a check-up or routine care, how often do you see your regular doctor as opposed to an assistant or partner?
- When you are sick and go to the doctor, how often do you see your regular doctor as opposed to an assistant or partner?

Length of relationship with a single provider

- How long has this person/place been your doctor/source of care?

Accessibility

Accessibility, geographic

- How would you rate the convenience of your regular doctor's/nurse's office location?

Accessibility, organizational

- How would you rate the hours that your doctor's/nurse's/place is open for medical appointments?... Is it poor, fair, good, excellent?
- How would you rate the usual wait for an appointment when you are sick and call the office asking to be seen?
- How would you rate the ability to get through to the doctor's office by phone?
- How would you rate amount of time your regular doctor/nurse/place spends with you?

Accessibility, financial

- Considering the amount of money you pay for visits, would you say it is extremely high, somewhat high, about right, or low?

Comprehensiveness

General comprehensiveness, i.e., all needs met

- Thinking about how well your doctor knows you, how would you rate your doctor's/nurse's ability to take care of all of your health care needs? Would you say it is poor, fair, good, or excellent?

Counseling

- Have you smoked in the past 3 years? (Yes/No)
- Has your regular doctor talked with you about smoking in the past year? (asked for recent smokers)
- Has your regular doctor talked with you about alcohol/drinking in past year?
- Has your regular doctor talked with you about diet in the past year?

Coordination of specialty care

Has your doctor ever recommended that you see a specialist for a specific health problem? IF YES, THEN

Thinking about the times your doctor has recommended you see a specialist, how would you rate, (Poor, Fair, Good, Excellent)

- The help your regular doctor/nurse/place gave you in getting an appointment for specialty care you needed?
- Regular doctor's involvement in your care when treated by a specialist or when hospitalized?
- The help your regular doctor gave you in understanding what the specialist or other doctor said about you?

Patient-provider relationship

Communication

- How would you rate the doctor's explanations of health problems or treatment? (Poor, Fair, Good, Excellent)

Compassion

- How would you rate the doctor's patience with your questions or worries? (Poor, Fair, Good, Excellent)
- How would you rate the doctor's caring and concern for you?
- How would you rate the doctor's respect for you?

Trust

- All things considered, how much do you trust your doctor? (Scale of 0-10 where 0 is "Not at all" and 10 is "Completely.")