

Primary Care Practice and Facility Quality Orientation: Influence on Breast and Cervical Cancer Screening Rates

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Background: Despite the importance of early cancer detection, variation in screening rates among physicians is high. Insights into factors influencing variation can guide efforts to decrease variation and increase screening rates.

Objectives: To explore the association of primary care practice features and a facility's quality orientation with breast and cervical cancer screening rates.

Study Design: Cross-sectional study of screening rates among 144 Department of Veterans Affairs (VA) medical centers and for a national sample of women.

Methods: We linked practice structure and quality improvement characteristics of individual VA medical centers from 2 national surveys (1 to primary care directors and 1 to a stratified random sample of employees) to breast and cervical cancer screening rates determined from a review of random medical records. We conducted bivariate analyses and multivariate logistic regression of primary care practice and facility features on cancer screening rates, above and below the median.

Results: While the national screening rates were high for breast (87%) and cervical cancer (90%), higher screening rates were more likely when primary care providers were consistently notified of specialty visits and when staff perceived a greater organizational commitment to quality and anticipated rewards and recognition for better performance.

Conclusions: Organization and quality orientation of the primary care practice and its facility can enhance breast and cervical cancer screening rates. Internal recognition of quality performance and an overall commitment to quality improvement may foster improved prevention performance, with impact varying by clinical service.

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For editorial comment, see page 247.

In response to accreditation demands on managed care organizations, integrated systems and their affiliated providers are placing increased emphasis on delivering preventive care services to their enrolled populations.¹ Despite these pressures and the importance of early detection of disease, variation in rates of test performance among primary care physicians is high.²⁻⁴ Research to date has shown that many patient- and provider-level factors influence whether indicated screenings are performed. In the case of sex-specific screening for breast and cervical cancer, examples of these factors include insurance status, access to a regu-

lar source of care, and sex of the provider, among others.⁵⁻¹² Primary care practice structure as well as organizational approaches to prevention and quality may also influence screening, yet little is known about how these factors act to foster or hinder performance.¹³ Because some of these organizational features may be mutable,^{14,15} insights into this area can provide direction to persons working to decrease variation and increase screening rates.

Evaluation has been limited into how organizational interventions influence provision of preventive care. Hulscher and colleagues¹⁶ found that systematic and well-planned changes to the process of care (teamwork, delegation of tasks), the structure of care (development of follow-up procedures or patient reminders), and the content of care (using health charts or flow sheets) improved screening performance. Additionally, performance was enhanced by using "learning through social influence," which includes utilization of small-group quality improvement (QI) activities.

A recent meta-analysis found that organizational change, when compared with other types of interventions, was among the most effective in improving immunizations and cancer screening services.¹⁷ Although the design and approach in these interventions varied, the common thread among them was an emphasis on system-level changes to foster screening, including delegation of prevention screening responsibility to nonphysician staff; and to some extent, relying on tech-

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niques consistent with the tenets of continuous QI (eg, incremental changes through iterative cycles of improvements). Additionally, the use of collaboration and teamwork were notably effective features toward improving use of sex-specific screening services, particularly cervical cancer screening.

Our goal in this study was to explore how primary care practice features and organizational characteristics similar to those described above are associated with sex-specific screening performance in Department of Veterans Affairs (VA) medical centers. The VA is the largest integrated healthcare system in the United States, providing care to more than 4.6 million patients a year, with a growth rate of 33% during the past 5 years.¹⁸ Since the mid-1990s, the VA has invested significant resources in improving its quality of care¹⁹; VA performance in the areas of preventive care and management of chronic diseases rivals or exceeds that of the private sector or other government health systems.²⁰ The VA also has made substantial invest-

ments in data systems, performance measurement, and management-oriented health services research, thereby allowing a comprehensive analysis of the environmental, organizational, and primary care practice features that may be associated with cancer screening performance rates. A better understanding of factors that enhance performance in the VA may provide insights to private sector health organizations working to improve quality of care.²¹

METHODS

Model of Organizational Influences on Cancer Screening

Our model for organizational predictors of cancer screening is displayed in **Figure 1**. Facility or site-based predictors include: academic affiliation, quality orientation, and size and complexity. Primary care practice features include continuity of care, coordination processes, accessibility of services and QI involvement. These aspects of the delivery of care occur within a context of patient, physician, and environment factors including geographic region and urban/rural designation. In this study, we were unable to control for individual patient or physician characteristics because our data were aggregated at the facility level.

Data Sources

We merged VA facility-level information from 4 data sources that provided the opportunity to link practice structure, organizational attributes, and facility performance data: (1) the 1996 VHA Primary Care Delivery Models Survey, (2) the 1997 National VA QI Survey, (3) the 1996 VA External Peer Review Program (EPRP) sponsored by the VA Office of Quality and Performance, and (4) the 1996 Outpatient Clinic file (OPC) from the VA Austin Automation Center. All sources identified sites in a common fashion, making possible their merger. This project was reviewed and approved by the Institutional Review Board of the VA Greater Los Angeles Healthcare System.

Measures

The 1996 VHA Primary Care Delivery Models Survey was mailed to the primary care directors at all VA medical centers in the United States (N = 160, including integrated systems) and assessed information on the organization of primary care services (100% response rate). Survey measures included questions gauging the pres-

Figure 1. Organizational Predictors of Cancer Screening

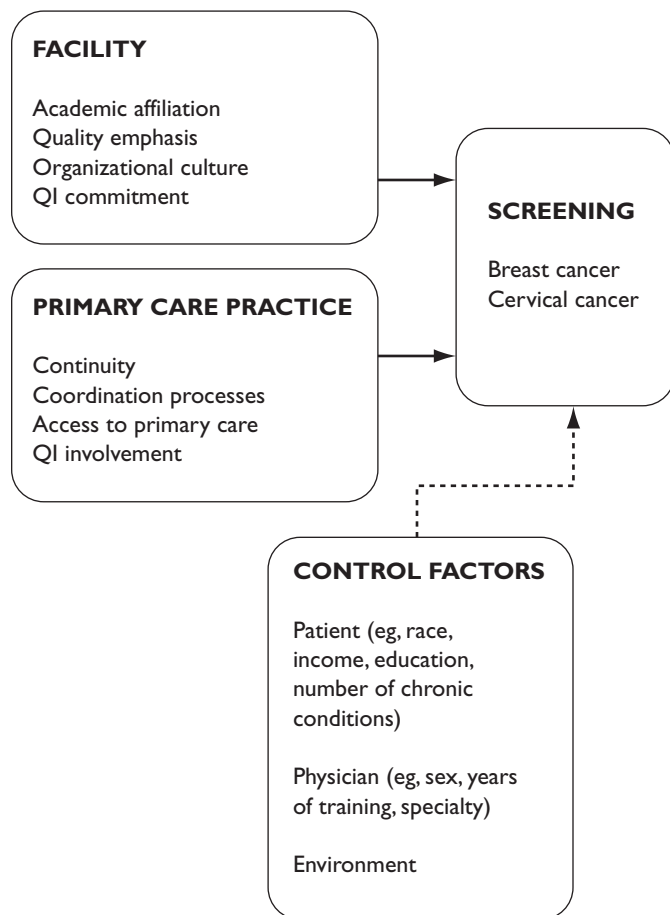


Table 1. Descriptive Statistics for Variables

Variable	Mean	SD	Minimum	Maximum
Screening Rates (%)				
Breast cancer (mammogram) (n = 144)	87	12	33	100
Cervical cancer (Pap smear) (n = 145)	90	9	60	100
Eligible Patients (%)				
Women veteran caseload	9.6	2.7	3.8	19.8
Facility*				
Organizational commitment to QI	348.1	15.4	304.4	385.1
Clear performance goals	376.1	17.4	316.7	426.8
Rewards and recognition	295.1	19.7	248.7	346.6
Academic affiliation (%)				
Yes	81.3		0	1
No	18.8		0	1
Primary Care Practice				
Primary-specialist coordination [†] (Frequency told of subspecialist consultation) (always-most of time-sometimes-occasionally-never)	2.9	1.2	1	5
Generalist staffing (number of positions)	7.4	4.6	0.0	26.0
Formal PCP-patient assignment [‡] (all/almost all-most-about half-some-few-none)	1.79	1.1	1	6
Primary care-based QI program [‡] (not planned-in planning-initiated-implementation begun-implemented-fully implemented)	4.1	1.5	1	6

*Aggregate scores of 5-point Likert scale questions (strongly disagree to strongly agree). Higher score denotes stronger agreement.

[†]Range of scores is 1 to 5 or 6. Lower score denotes higher performance.

[‡]Range of scores is 1 to 6. Higher score denotes a more fully implemented QI program.

PCP indicates primary care practice; QI, quality improvement.

ence of discrete primary care practice features (eg, assignment of patients to specific providers, processes used to enhance screening, presence of a primary care-based QI program) and levels of independence (eg, level of primary care program implementation and level of practice coordination). **Table 1** displays descriptive statistics for each variable.

The 1997 National VA QI Survey was administered by the VA Management Decision and Research Center to medical center staff (71% response rate) who rated service quality and aspects of facility culture (eg, extent to which their facility promoted innovation and risk taking, teamwork, and cooperation)²² as well as commitment to service quality goals and the level of rewards and recognition supporting improved service quality.²³ We utilized 3 variables from this survey. The “Quality System Survey Scale” assessed whether problem-solving practices, data availability and management practices reflect a genuine commitment to continuous QI. “Performance Goals” assessed whether individual performance goals emphasize service QI. “Reward and Recognition”

assessed whether staff efforts to improve service quality are recognized and rewarded. We rescaled facility scores (×100) to facilitate interpretation in the logistic model (ie, a change of 1 unit increases the odds of being above the median screening rate) and examined both the continuous measures and dichotomized (high/low) versions cut at the median value for each scale.¹⁵

Breast and cervical cancer screening rates were assessed by the 1997 VA EPRP, in which personnel conduct periodic chart reviews of a random, national sample of patients from primary care and subspecialty clinics. At the time of the study, trained nurse abstractors evaluated whether patients had received appropriate breast and cervical cancer screening using guidance from VA policy that was based on the 1996 US Preventive Services Task Force Guide to Clinical Preventive Services.²⁴ The *Guideline for Breast Cancer Screening* advised a screening mammogram every 2 years for women between the ages of 50 and 69 who had not undergone bilateral mastectomy. The *Guideline for Cervical Cancer Screening* advised a Pap smear every

3 years for women between the ages of 18 and 65 years, who had not had a total hysterectomy. We obtained site-specific results for 144 medical centers that indicated their percentage of reviewed charts that were guideline-adherent (theoretical range from 0% to 100%).

We used the 1996 OPC, a national dataset comprised of all VA outpatient encounters, to identify the proportion of women veterans served at each VA facility in fiscal year 1996 (October 1, 1995, through September 30, 1996): unique women veterans with 1 or more outpatient clinic visits divided by the total number of veteran users in the year.

Statistical Analyses

We merged variables from the 4 data sources using numeric station identifiers, resulting in a uniform database comprising facility, practice, and screening data for 144 medical centers. We focused on 2 dependent variables: percent of reviewed charts that were guideline-adherent for (1) mammogram and (2) Pap smear performance. Our independent variables included facility and primary care practice features as shown in Figure 1 and Table 1.

First, we examined the distribution of breast and cervical cancer screening rates (mean and range) among the national sample of VAs. We used correlation coefficients, analysis of variance, and ordinary least squares regression to assess the association between continuous and discrete independent variables hypothesized to have an influence on sex-specific screening practices. We subsequently categorized selected continuous variables with marked skew (eg, number of general internal medicine physicians), transforming them by setting cut

points for high and low scores at the median value. We ran a logistic regression model to examine the independent predictors of high versus low performance rates of breast and cervical cancer screening. Variables were included if bivariate analysis indicated their significance at $P < .20$ with either screening test. We conducted iterative model analyses to confirm our findings using SPSS/PC (version 11.5, SPSS, Inc; Chicago, Ill). We tested the models using the Hosmer-Lemeshow test and both models met criteria for goodness of fit.

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RESULTS

Variation in Adherence to Screening Guidelines

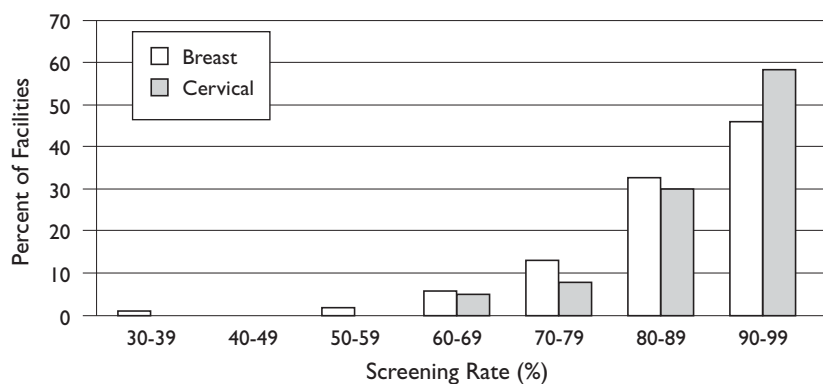
While mean rates of adherence to guidelines were high, we still noted substantial variations in rates of breast cancer screening (mammogram) and cervical cancer screening (Pap smear) (Figure 2). The mean rate for mammogram performance was 87% with a range of 33% to 100%, and for Pap smear performance, 90% with a range of 60% to 100%. The median cut point was 89% (n = 72 at or below the median and n = 72 above the median) for breast cancer screening and 91% (n = 72 at or below the median and n = 73 above the median) for cervical cancer screening.

Organizational Variations in Screening

The percentage of medical centers with above-median breast and cervical cancer screening rates by facility and primary care features are shown in Tables 2 and 3. A significant association was noted between the quality orientation variables and better breast cancer screening performance, with the exception of organizational commitment to QI. In the case of cervical cancer screening, higher rewards and recognition scores were significantly associated with better performance, with a trend toward better performance for facilities with greater commitment to QI and higher ratings for performance goals being linked to quality. Overall, academic VAs performed no better than nonacademic sites, although large academic programs (ie, greater than median numbers of internal medicine house officers) did outperform small ones.

Of the primary care features, higher generalist staffing was associated with better breast cancer screening performance and a non-significant trend was noted for better

Figure 2. Variations in Breast and Cervical Cancer Screening Rates



n = 144 for breast cancer and 145 for cervical cancer. Data from VA Office of Quality and Performance, External Peer Review Program (EPRP) (1997).

performance in sites with greater primary-specialist coordination. Sites with less formal assignment of patients to primary care providers were more likely to have high breast cancer screening rates. For cervical cancer screening, the only primary care feature associated with better performance was having a fully implemented QI program.

Sites with larger women veteran caseloads were marginally more likely to be high performers of cervical cancer screening (55.6%) than sites with fewer women patients (45.2%) (Table 2). We found no differences in screening performance by region or urban/rural designation.

Predictors of Breast and Cervical Cancer Screening Rates

The results of the logistic regression for breast cancer (mammograms) screening rates and for cervical cancer (Pap smears) screening rates among VA medical centers are displayed in Table 4. Variables that predicted whether a site was more likely to be a high performer were different for the 2 screening procedures. In multivariate analyses, large academic facilities with greater numbers of house staff were more likely to have high rates for breast cancer screening (odds ratio [OR] = 3.49, 95% confidence interval [CI] 1.27-9.58). The wide confidence intervals likely relate to variability in housestaff volumes. High staff perceptions that the facility rewards and recognizes service quality also predicted that a site had higher mammography rates (OR = 1.04, 95% CI 1.01-1.08). Two measures of primary care practice were independently associated with mammography performance. First, high levels of primary care-subspecialist coordination (ie, primary care providers are always notified of subspecialty consults)

Table 2. Percent of Sites with Above-Median Performance for Breast (Mammogram) and Cervical Cancer (Pap Smear) Screening by Facility and Eligible Patients

Variable	Mammogram (%) (n = 144)	Pap Smear (%) (n = 145)	Source
Facility			
Organizational commitment to QI*			1997 QI
High	51.4	55.7 [‡]	
Low	47.8	45.7	
Individual performance goals linked to QI*			1997 QI
High	57.5 [‡]	57.5	
Low	40.9	43.3	
Rewards and recognition for quality*			1997 QI
High	59.4 [‡]	62.3 [§]	
Low	37.9	35.8	
Academic affiliation [†]			1996 PCP
Large academic program	59.3 [‡]	61. [‡]	
Small academic program	41.8	45.5	
Eligible Patients			
Women veteran caseload*			1996 OPC
High	52.80	55.6 [‡]	
Low	47.20	45.2	
Screening for all facilities	87	90	1997 EPRP

*All continuous and ordinal variables were dichotomized into above (high) or below (low) the median.

[†]Primary care director reported an academic medical training program affiliation. Large programs had more than the median number of internal medicine house officers, while small programs had fewer.

[‡] $P < .05$.

[§] $P < .005$.

[‡]Bivariate associations between $P < .05$ and $P < .20$ included in logistic models.

1996 EPRP indicates the 1996 VA External Peer Review Program sponsored by the VA Office of Quality and Performance; 1996 OPC, the 1996 Outpatient Clinic file from the VA Austin Automation Center; 1996 PCP, the 1996 VHA Primary Care Delivery Models Survey; 1997 QI, the 1997 National VA QI Survey.

were associated with above-median performance of mammograms for breast cancer screening (OR = 6.24, 95% CI 1.26-30.77). In contrast, stringent patient assignment to primary care providers (defined through self-report as all/almost all patients being formally assigned to a primary care provider) was associated with below-median mammography screening rates (OR = 0.36, 95% CI 0.14-0.93). Sites with such stringent primary care provider-patient assignment tended to be in small cities or more rural areas (62.5% small city, semi-rural, or rural vs 45.1% large urban, $P = .021$, data not shown) and were less likely to be academic (73.3% vs 50.4%, $P = .018$, data not shown).

Medical centers where staff perceived greater commitment to service quality were more likely to have above-median rates for cervical cancer screening (Pap smear) (OR 1.06, 95% CI 1.01-1.12). Sites with at least 1 primary care-based QI program were more likely to demonstrate above-median cervical cancer screening

Table 3. Percent of Sites with Above-Median Performance for Breast (Mammogram) and Cervical Cancer (Pap Smear) Screening by Primary Care Practice Features

Variable	Mammogram (%) (n = 144)	Pap Smear (%) (n = 145)	Source
Primary-Specialist Coordination*			1996 PCP
High	61.9 ^s	42.9	
Low	47.5	51.2	
Generalist Staffing			1996 PCP
High	58.9 [†]	50.7	
Low	39.7	48.5	
Formal PCP-Patient Assignment [‡]			1996 PCP
High	42.3 [‡]	48.1	
Low	58.5	52.3	
Primary Care-based QI Program			1996 PCP
Fully implemented	50.0	69.2 [*]	
2+ PC-based process teams	56.3	56.3	
0 to 1 PC-based process team	44.0	44.7	
Not fully implemented	49.6	46.6	

*Primary care-subspecialist coordination was measured as a function of the frequency with which primary care providers were always (high) or less than always (low) told of subspecialty consultation results.

[†]High scores for formal patient assignment to primary care providers refer to "all/almost all" patients being formally assigned, with low scores referring to all other categories (most, some, a few, none).

[‡]*P* < .05; ^sbivariate associations between *P* < .05 and *P* < .20 included in logistic models.

1996 PCP indicates the 1996 VHA Primary Care Delivery Models Survey.

performance (OR = 4.00, 95% CI 1.10-14.54). The wide confidence intervals for some predictor variables illustrate the significant structural variability in how primary care is organized in the VA. Finally, the proportion of women veterans served at a given medical center was a significant predictor of higher Pap smear screening rates (OR = 1.32, 95% CI 1.07-1.64).

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DISCUSSION

Our study demonstrates that certain specified primary care practice features as well as characteristics of an organization's quality orientation can influence provision of breast and cervical cancer screening. The VA, a large integrated, medical system, provides a unique opportunity to evaluate the effect of nonpatient factors on preventive services because income and insurance coverage are not significant barriers to care. Furthermore, services are provided throughout the United States and across age-eligible adult patients. The many

facilities providing primary care services permit a study of differences among facilities.

While this study assesses services provided to female patients only, the size of the VA population assures an adequate sample from which to generalize. Women veterans currently account for approximately 6% of the VA user population, representing about 322 000 unique patients. More than half of the women veterans are adults younger than 45 years,²⁵ most of whom require cervical cancer screening and many of whom are eligible for breast cancer screening.

Breast Cancer Screening

Factors predicting the likelihood that sites have higher rates of breast cancer screening were different from those for cervical cancer screening. Whereas both screening tests are often evaluated in concert, they require different levels of involvement from primary care providers, and different staff training and equipment. Breast cancer screening generally requires a referral for mammography; performance can be based on ease of patient access to the appropriate radiology center and how well care is coordinated. Coordination characteristics of the primary care practice, such as group practice, scheduling processes, and use of flow sheets and reminders, have been shown to be associated with mammography utilization,²⁶ as has overall coordination among providers, especially for older low-income women.²⁷ We found that VA sites where primary care providers were always notified of subspecialty consultation results were significantly more likely to be "high" performers of mammography. As a proxy for ease of care coordination, consult notification may be particularly important for breast cancer screening, where primary providers require the review and feedback from mammography specialists.

Cervical Cancer Screening

In contrast to breast cancer screening, cervical cancer screening requires interaction with a provider whose office is set up to perform Pap smears and who has skill and experience in this procedure. We found that sites were more likely to be high performers of Pap smears when the female proportion of patients was

Table 4. Facility and Practice Predictors of Above-Median Performance of Breast (Mammogram) and Cervical Cancer (Pap Smear) Screening: Results of Logistic Regression

Predictor Variables	Mammogram*		Pap Smear†	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Facility				
Commitment to QI	0.98	0.94, 1.03	1.06 [‡]	1.01, 1.12
Clear performance goals	0.99	0.95, 1.04	0.96	0.92, 1.004
Rewards and recognition for quality	1.04 [‡]	1.01, 1.08	1.00	0.97, 1.04
Academic affiliation, higher house staff	3.49 [‡]	1.27, 9.58	2.25	0.84, 6.01
Primary Care Practice				
Primary-specialist coordination	6.24 [‡]	1.26, 30.77	0.48	0.11, 2.14
Generalist staffing high	1.30	0.51, 3.33	0.78	0.31, 1.99
Formal PCP-patient assignment	0.36 [‡]	0.14, 0.93	0.57	0.22, 1.43
PC-based QI program	0.51	0.15, 1.75	4.00 [‡]	1.10, 14.54
PC-based QI program with 2+ teams	2.12	0.79, 5.66	0.98	0.37, 2.59
Eligible Patients				
Women veteran caseload higher	1.12	0.91, 1.37	1.32 [‡]	1.07, 1.64

*n = 144 for breast cancer screening. Overall test of model coefficients: chi-square = 28.305, *df* = 10, *P* = .002.
 n = 145 for cervical cancer screening. Overall test of model coefficients: chi-square = 24.382, *df* = 10, *P* = .007.
[‡]*P* < .05.

higher and when sites had a primary care-based QI program. Because most women’s health clinics within the VA are not sufficiently large to warrant a separate QI program, this finding suggests that a system may need to make special efforts to meet the medical screening needs of its minority populations.

Organizational Influences

Academic medical centers with large internal medicine training programs (ie, above-median number of internal medicine house staff) performed better than centers with small programs in the area of breast cancer screening. Subsequent research has demonstrated that such programs reside in the more complex VA medical centers (ie, large tertiary care centers) which, in turn, are significantly more likely to provide on-site access to both basic and specialized women’s health services.²⁸ Stronger linkages to university affiliates in these large programs may also facilitate access to mammography services.

We found evidence for a positive relationship between characteristics of a QI program and screening performance in several QI-related measures.²⁸⁻³⁰ Organizations whose staff had above-median expectations that higher quality performance was recognized and rewarded were more likely to be high performers of breast cancer screening. Similarly, sites where staff

perceived greater commitment to higher service quality were more likely to have above-median cervical cancer screening rates. The relationships suggest the value of translating performance goals into cogent messages throughout the organization.

Limitations

This cross-sectional assessment of variations in sex-specific preventive screenings has a number of limitations. While we found a number of independent predictors of screening performance at the level of the medical center and primary care practice, our study findings may have nonetheless been limited by insufficient variation in rates of screening across VA medical centers. The VA’s performance measures focus on accountability for the population of patients served by each medical center and the chart-based review allows for screening to have occurred in non-VA settings. For example, if a chart indicated that the Pap smear or mammogram had been carried out elsewhere, credit for performance was still given. Differences in screening rates among sites were therefore not simply a reflection of characteristics of the particular sites but also other sources of care and insurance coverage in the area. We were unable to assess the impact of individual patient and provider characteristics as data were aggregated by facility and not assessed at the individual level.

CONCLUSIONS

Specified primary care practice features as well as characteristics of an organization's quality orientation were found to influence provision of cancer screening. Furthermore, factors predicting the likelihood that sites have higher rates of breast cancer screening were different from those for cervical cancer screening. Sites with above-median rates of breast cancer screening were more likely to notify primary care providers of subspecialty consultation results, were more likely to have staff who perceived that higher-quality performance is recognized and rewarded, and were more likely to have larger numbers of internal medicine house staff. Sites with above-median rates of cervical cancer screening were more likely to have a primary care-based QI program, staff who perceived a greater commitment to higher service quality, and more women patients.

This study demonstrated that both practice features and facility attitudes about quality affect the delivery of preventive services. However, the individual service may be affected differentially. Focus on quality may lead to improved care, but it is necessary to assess direct effect by clinical service rendered.

Acknowledgments

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