ORIGINAL REPORTS: HEALTH DISPARITIES

ROLE OF PATIENT RACE/ETHNICITY, INSURANCE AND AGE ON PAP SMEAR COMPLIANCE ACROSS TEN COMMUNITY HEALTH CENTERS IN FLORIDA

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Community Health Centers (CHCs) are the nation's primary care safety net for vulnerable populations, including racial/ethnic minorities, immigrants, migrant workers, and those who are uninsured. Women from such population sub-groups contribute disproportionately to cervical cancer incidence, morbidity, and mortality due, in large part, to the underutilization of Papanicolau (Pap) smear screening. Routine Pap smear screening can detect the onset and prevent progression of cervical malignancies. This article reports findings of a cross-sectional study to investigate the association between Pap smear compliance and patient race/ethnicity, insurance, and age for more than 60,000 women seen in a network of CHCs in Florida. Results of this study indicated a strong association between race/ethnicity and Pap smear screening in CHCs. Among women aged 21–45 years, Hispanics were twice as likely to receive Pap smear screening, while Blacks were 1.45 times more likely to receive Pap smear screening, when compared to White women. These results were unexpected because most studies have shown that Hispanic women are less likely to receive screening than their Black and White counterparts. These findings highlight the need to further explore the contribution of race/ethnicity, insurance, age, and other risks on health disparities associated with cervical cancer screening in CHCs. Moreover, results from this study have subsequently led to the development of clinical data reporting software to support Pap smear compliance monitoring within CHCs, as well as best practices regarding standardized documentation of Pap smear within electronic health records. (*Ethn Dis.* 2010;20:321–326)

Key Words: Cervical Cancer Screening, Race, Ethnicity, Insurance, Pap Smears, Disparity

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INTRODUCTION

In 2009, it was expected that more than 11,270 women in the United States would be diagnosed with cervical cancer, and more than 4,070 would die from the disease.[1] Black women and Hispanic women contribute disproportionately to cervical cancer incidence, morbidity, and mortality.[2,3] Underutilization of Pap smear screening accounts, in large part, for these disparities.[4] Routine Pap smear screening can detect pre-cancerous cervical lesions or dysplasia, reducing the risk of disease onset and progression.

Black women and Hispanic women contribute disproportionately to cervical cancer incidence, morbidity, and mortality.[2,3]

Since the late 1980s, a significant body of research has examined factors contributing to disparities in Pap smear screening compliance and cervical cancer disease outcomes. As a result, patient

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risk factors associated with Pap smear screening compliance in the United States are generally well known and include sociodemographic factors, lack of insurance, immigration status, English literacy, cultural beliefs, perceptions of vulnerability, and lack of a usual source of care.[5–21]

Research investigating the role of such factors has largely been derived from studies conducted either in insured populations using claims data, or with disadvantaged women using self-reported surveys or medical chart audits. The advent of electronic health record (EHR) systems in public health presents new opportunities to study Pap smear screening disparities among large groups of vulnerable women without interview bias that may confound findings. This study uses available data from EHR systems implemented in the community health centers (CHCs) to understand the role of race/ethnicity among a large cohort (*n*=63,053) of underserved women seen in 10 CHCs in Florida. The objectives of this study were: (1) to identify the role of patient race/ethnicity, insurance and age in a large cohort of CHC patients; and (2) to identify opportunities for quality care initiatives to improve Pap screening rates.

Community health centers serve as the nation's primary care safety net for the poor and undeserved, those individuals most likely to contribute to adverse cervical cancer outcomes.[22] The CHC program is operated and largely funded by the Bureau of Primary Health Care in the Health Resources and Services Administration (HRSA) of the US Department of Health and Human

Services. There are approximately 1,000 CHCs located in a number of low-income urban and rural areas, which collectively provide comprehensive primary, behavioral and dental care to more than 16 million underserved Americans on an annual basis. Nationally, 65% of CHC patients are from minority groups and 85% either have no healthcare insurance or are covered by public insurance.[23] Because care in CHCs is provided to all persons regardless of ability to pay, conducting health disparity research across CHCs provides a unique opportunity to examine the role of patient risk factors on Pap smear screening, independent of the confounding influence of insurance status.

Health Choice Network, Inc. (HCN) is an integrated network of 63 member CHCs in Florida, Utah, New Mexico, Kansas, Missouri, Maryland, West Virginia and Hawaii. In 2008, all CHCs receiving federal funding from HRSA were required to begin reporting annual Pap smear compliance as part of HRSA's Quality of Care measures.[24] In an effort to better understand disparities in Pap smear screening among patients served, medical leadership from 10 member CHCs in Florida supported investigation into the role of patient characteristics and Pap smear compliance.

METHODS

Population

We used available data from HCN's EHR system, an electronic health record database integrating patient registration information, claims history, laboratory data, prescription data, practice history and clinical assessment information, captured at point-of-care and maintained by HCN. Among the 10 CHCs in this study, five of the CHCs had fully integrated EHR systems at the time the analyses were conducted and data extracted for this study from those five CHCs included demographic data, laboratory data, clinical chart data and

claims data. The other five CHCs in this study were in varying stages of EHR implementation of clinical chart documentation. Data for these five CHCs include demographic, laboratory and claims data only. Variables selected from the EHR database included: CHC where medical care was received, health insurance, patient race, patient ethnicity, patient age, last visit date, last provider seen, receipt of Pap smear, and history of hysterectomy. Other variables considered, but deemed unreliable due to inconsistent data entry in the EHR database, included income level, number in household, primary language and marital status.

Each of the 10 CHCs, all in Florida, self-selected to participate in the study and had at least five years of claims history. As mentioned above, five of the ten CHCs also had at least three years implementation of a comprehensive electronic health record, including electronic chart documentation, and the other five CHCs had a minimum of three years history of laboratory interface.

The population for the study was extracted from the EHR system using the same criteria that HRSA mandates CHCs to use for reporting the cervical cancer screening quality measures to the federal government through the Uniform Data System (UDS).[24]. Data for this study was extracted in June 2008, therefore the most complete calendar year of data that was available was 2007. The initial dataset included 72,134 women, aged 21 to 64 years; of those, 8,180 (11.3% of original dataset) were missing information for either insurance or race/ethnicity, resulting in a final *N* of 63,954. Fifty-three percent of the study participants were from six CHCs in southeast Florida, 23% from one CHC in southwest Florida and the remainder of the patients from three CHCs in the greater Tampa area. The analysis was restricted to data on women aged 21 to 64 years seen at least one time for a medical visit in one of the 10 CHCs during 2007.

Outcome Variable

The outcome variable was whether a woman had or did not have a Pap smear within the past three years, based on an electronic query of CHC patient databases. Having had a Pap smear within the past three years was confirmed by the patient having had a Pap smear billing code in the patient claims history module of the electronic health records database. When available, Pap smear was also confirmed by the clinician having documented compliance in a reportable field in the patient's electronic medical record.

Independent Variables

We assessed the following predictors of Pap smear screening compliance: (1) health insurance coverage (uninsured or insured); (2) race/ethnicity (White non-Hispanic, Black non-Hispanic, or Hispanic); and (3) age (21–45, 46–64).

Analysis

The basic analytic framework for this study was logistic regression of the binary outcome of Pap smear (yes vs no). The main predictors of interest were race/ethnicity, insurance, and age. All analyses were adjusted by CHC in order to eliminate possible confounding. Backward stepwise variable selection procedure was used with a $P<.10$ threshold for inclusion in the final model. Pairwise interactions were tested and included in the final model based on a 5% significance level. For the final model, adjusted odds ratios (ORs) and their 95% confidence intervals (CIs) were calculated. SPSS version 15 was used for all analysis.

RESULTS

The study population of 63,954 women was ethnically/racially diverse with over 77% of the population Hispanic or Black (non-Hispanic). In addition, 70% of the population was uninsured (Table 1).

Table 1. Characteristics of patients seen across 10 community health centers in Florida from January 1, 2007 to December 31, 2007 (N=63,894)

	n	%*	Pap compliance (%)
Race/ethnicity			
White, non-Hispanic	14,239	22.3	36.3
Black, non-Hispanic	18,439	28.8	48.5
Hispanic	31,276	48.9	63.9
Insurance			
Insured (public or private)	19,184	30.0	53.2
Uninsured	44,770	70.0	53.5
Age group			
21–30	17,950	28.1	60.8
31–40	14,559	22.8	57.0
41–50	14,901	23.3	49.6
51–60	12,614	19.7	45.9
61–64	3,930	6.1	43.7
Age at last visit in 2007			
Mean (SD)	40.5 (12.5)		
Median	40		

* Column percent

The chosen model for estimating the odds of having received a Pap smear included two pairwise interactions: insurance status by age ($P<.001$) and race/ethnicity by age ($P<.001$) (Table 2). Race/ethnicity was a significant predictor of receipt of Pap smear screening, but its effect depended on age. Among women aged 21–45 years, Black women were 1.45 times more likely to receive a Pap smear than Whites (OR=1.45; 95% CI=1.36, 1.54). Hispanics were two times more likely to receive a Pap smear than Whites (OR=2.08; 95% CI=1.96, 2.21). Among women aged 46–64 years, the trends were similar, though not as strong as for younger women, and also reached statistical significance at the 5% level. Black women in this age group had a 1.13 times greater likelihood of having received a Pap smear compared to White women (OR=1.13; 95% CI=1.04, 1.21); and Hispanic women had a 1.68 times greater likelihood of having received a Pap smear compared to Whites (OR=1.68; 95% CI=1.56, 1.80). Likewise, the effect of insurance on receipt of Pap smear screening also depended on age. Among younger

women, those who were insured had a higher chance of having received a Pap smear when compared to uninsured women (OR=1.45; 95% CI=1.38, 1.51). Among those aged 46–64 years, a smaller effect was attributed to insurance (OR= 1.10; 95% CI=1.03, 1.17).

Given the two significant interactions with age, the role of age was described in subgroups defined by insurance and race/ethnicity. Among insured Black women, those aged 21–45 years had a 2.21 greater chance of having received a Pap smear than those aged 46–64 years (OR=2.21; 95% CI=2.03, 2.38). Among insured Hispanic women, the younger age group had a 2.13 increased likelihood of having received a Pap smear than the older group (OR=2.13; 95% CI=1.96, 2.30). Younger, insured White women also had a higher chance of having received a Pap smear than older, insured White women (OR=1.71; 95% CI=1.57, 1.86). Among uninsured women, the effect of age on receipt of Pap smear within each race/ethnic category was similar, though not as strong, as that seen among insured women.

DISCUSSION

To our knowledge, this is the first study investigating health disparities in cervical cancer screening compliance among a large group of women receiving care at CHCs based on data from an EHR system. This study revealed that women from racial/ethnic minority groups, women who are insured, and women who are younger (aged 21–45), were more likely to receive Pap smear screening when compared to White women, uninsured women and older women (aged 46–64).

The encountered interaction among the variables tested in this study highlights the underlining complexity in studying large and underserved populations with multiple access to care issues. In terms of insurance, the relationship between insurance and receipt of Pap smear screening varied by age. Among women aged 21–45 years, having insurance increased the likelihood of Pap smear compliance by 45% (OR=1.45; 95% CI=1.38, 1.51). The role of insurance among older women was far less pronounced, with insured women being only 10% more likely to have received a Pap smear within the past 3 years than uninsured women (OR= 1.10; 95% CI=1,03, 1.17) (Table 2). The role of insurance in explaining health disparities requires special consideration when studying the patient population of CHCs. The centers participate in federal, state and county-wide programs designed to reduce Pap smear screening disparities among poor, underserved and uninsured women. Several of the CHCs in this study participated in the Center for Disease Control's National Breast and Cervical Cancer Early Detection Program (NBCCEDP), which offers Pap smear screening to uninsured and underserved women, and Project Screen, an initiative of the Miami Dade Department of Health, which offers free Pap smear screening to poor and uninsured women aged 50–64 years, during the timeframe

Table 2. Adjusted odds ratio estimates for characteristics of patients associated with Pap smear compliance rates across 10 community health centers in Florida - January 1, 2007 to December 31, 2007 (N=63,894)

	n	OR (95% CI) *
Effect of race/ethnicity by age group		
Age group 21–45		
Black, non-Hispanic	11,025	1.45 (1.36, 1.54)
Hispanic	19,424	2.08 (1.96, 2.21)
White, non-Hispanic	58,034	1.0
Age group 46–64		
Black, non-Hispanic	7,414	1.13 (1.04, 1.21)
Hispanic	11,852	1.68 (1.56, 1.80)
White, non-Hispanic	6,205	1.0
Effect of insurance status by age group		
Age group 21–45		
Insured	12,808	1.45 (1.38, 1.51)
Uninsured	6,376	1.0
Age group 46–64		
Insured	25,675	1.10 (1.03, 1.17)
Uninsured	19,095	1.0
Effect of age group by insurance and race/ethnicity		
Insured		
Black, non-Hispanic		
Age group 21–45	4,816	2.21 (2.03, 2.38)
Age group 46–64	2,397	1.0
Hispanic		
Age group 21–45	4,701	2.13 (1.96, 2.30)
Age group 46–64	1,744	1.0
White, non-Hispanic		
Age group 21–45	3,291	1.71 (1.57, 1.86)
Age group 46–64	2,235	1.0
Uninsured		
Black, non-Hispanic		
Age group 21–45	6,209	1.68 (1.57, 1.80)
Age group 46–64	5,017	1.0
Hispanic		
Age group 21–45	14,723	1.62 (1.54, 1.71)
Age group 46–64	10,108	1.0
White, non-Hispanic		
Age group 21–45	4,743	1.31 (1.20, 1.41)
Age group 46–64	3,970	1.0

* OR=odds ratio; CI=confidence interval. OR estimates are based on the logistic regression model which includes age, race/ethnicity, insurance, age×race/ethnicity, age×insurance, and center (*P*<.01). ORs are considered significant if the 95% CI does not include 1.0.

The most dramatic finding in our study was that Hispanic and Black women were significantly more likely than White women to receive screening, even when adjusting by age group, insurance and CHC.

could be partially due to the unique mix of Hispanic patients in South Florida, many of whom are from Cuba. Hispanic women from Cuba, when compared to Hispanic women from Mexico, Puerto Rico and South and Central America, have rates of cervical cancer similar to White women.[28] This may indicate that Cuban women are more likely to receive screening than other Hispanic groups. While ethnic subgroup could not be determined from this dataset, it is possible that this information would help to further interpret results. In addition, the lower screening compliance among White women may also suggest that the White non-Hispanic women in this study have particular access-to-care barriers, such as poverty or low literacy, not revealed in prior studies. This highlights the importance of health disparities investigations, particularly among CHC populations, in order to more fully understand barriers to care among our nation's poorest residents.

These data reveal that CHCs play a unique role in the delivery of Pap smear screens to populations most at risk of cervical cancer. One factor that may help to explain our findings, and should be studied further, is the make-up of providers at the CHCs studied. Many CHC providers are from racial/ethnic subgroups and bilingual. As a result, we postulate that providers in the CHCs included in this study may be more culturally competent than their non-

studied. While the percent of patients screened through these programs in relation to the entire study population could not be assessed, it is possible that such initiatives helped to narrow the gaps in screening between insured and uninsured women and between older and younger women that might otherwise have been greater.

The most dramatic finding in our study was that Hispanic and Black women were significantly more likely than White women to receive screening, even when adjusting by age group, insurance and CHC. This was an unexpected result given that in prior studies Hispanic women and Black women had a higher prevalence of cervical cancer than White women,[25,26] and that Hispanic women were less likely than White women to report routine Pap smear screening among national samples such as the National Health Interview Survey.[27] Our results

CHC counterparts, and better able to communicate the risks of cervical cancer and the importance of regular screening. Another factor that may be important in understanding the results is that CHCs are supported by HRSA. HRSA drives several initiatives within CHCs to improve the delivery of quality care and reduce health disparities including the evidence-based Health Disparity Collaborative, expert consensus development of performance measures and key health indicators, and uniform data reporting which is required annually by CHCs. Awareness and application of these initiatives may work to facilitate improved screening for patients most at risk of health disparities within the CHC community. Finally, it is hypothesized that operational quality care efforts within the CHCs, driven by accrediting organizations and supported by comprehensive EHR systems such as the one currently being implemented at Health Choice Network, contribute to improving organizational infrastructure that aids in reducing health disparities for patients seen at CHCs

In addition to providing information on Pap smear screening rates across the CHCs participating in this study, this research also translated into meaningful hands-on activities that were subsequently implemented by medical leadership. Identifying the inclusion and exclusion criteria for this study highlighted variability in standardization of Pap smear reporting at the patient and provider level. Following this identification, recommended guidelines for standardized EHR documentation were adopted by medical leadership and subsequently disseminated to over 100 primary care providers. In addition, review of benchmark data of Pap smear compliance across the CHCs participating in the study resulted in increased collaboration among medical leadership and the development of a policies and procedures identifying best practices for improved patient outcomes of preventive cancer screening and other

recommended primary care guidelines. Finally, the process to extract and analyze data from an EHR system for this study provided the foundation and positioned Health Choice Network to obtain funding for an innovative quality improvement reporting system that currently focuses on 12 preventive and chronic care guidelines, including Pap smear screening.

LIMITATIONS

An important limitation of this study is the independent influence of the 10 CHCs included in this study, all of which are located in Florida. While the final model controlled for CHC, it did not take into consideration important organizational differences among the CHCs such as scope of services, CHC geographic location, CHC demographic make-up or organizational culture, among others, that may be important in explaining Pap smear compliance. It is suggested that the model could be improved by an expanded analysis including additional CHCs from different geographic areas that have different patient race and ethnicity composites, as well as adjusting for other potentially important organizational variables.

Another important limitation of this study is that five of the 10 CHCs included in the analysis were not using the electronic chart documentation module in the EHR system. As a result, not all of patients in the study had a complete electronic patient chart at the time of the study. Compliance with Pap smear testing for these patients could be derived only through claims data and/or the laboratory interface. Internal analysis has suggested that data reliability and validity of Pap smear screening may be improved when information from provider electronic clinical charting is used in addition to claims and laboratory data. Of the 10 CHCs, only five of them had all providers using full EHR capabilities

during all of 2007. Therefore, it is likely that Pap smear compliance was underreported due to those patients who had a Pap smear done outside the CHC that was subsequently not recorded in the electronic chart. The rate of underreporting is small (estimated at less than 5%) according to medical leadership and, though important at the patient level, underreporting would not be expected to change results of this study at an aggregate level.

Finally, this study uses data from women seen across CHCs and, as such, represents a largely underserved and vulnerable population. Therefore, findings are not generalizable to the make-up of the overall US population.

NEXT STEPS

Our research indicates that race/ ethnicity, insurance and age play a significant role in the receipt of Pap smear screening in the context of Health Choice Network. While interesting, these results do not provide a clear answer on how Pap smear screening in this population can be improved overall. Furthermore, the potential disparity in screening among White women is troubling and should be included in future research to see if results are consistent across other health care services and disease areas in CHCs.

Next steps should include further inquiry into Pap smear screening compliance rates with a larger number of CHCs in order to further understand and interpret findings presented here. In addition, we recommend that future studies incorporate an expanded list of variables, such as patient education and income levels, provider characteristics and organizational facilitating conditions. The goal of further inquiry should be to identify determinants of non-compliance and to suggest the design of meaningful interventions that can help to reduce Pap smear screening health disparities.

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