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A Multi-Level Approach to Understanding Pap Smear Compliance Across Community Health Centers in Florida

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UNIVERSITY OF MIAMI

A MULTI-LEVEL APPROACH TO UNDERSTANDING PAP SMEAR COMPLIANCE
ACROSS COMMUNITY HEALTH CENTERS IN FLORIDA

By

Nicole J. Cook

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

December 2008

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A Multi-Level Approach to
Understanding Pap Smear Compliance
across 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, migrant workers and the uninsured. Women from these populations contribute disproportionately to cervical cancer morbidity and mortality, largely due to underutilization of Pap smear screening. The purpose of this cross-sectional study was to identify factors that may be related to Pap smear screening compliance among a large cohort of women seen at 10 Community Health Centers in Florida. Building upon an ecologic framework, this research went beyond patient-level risk factors, which are generally well-known, and explored provider and organizational variables that may also be associated with Pap smear screening compliance in this population.

Ten CHCs in Florida met study inclusion criteria of having at least four complete years of claims and patient registration data stored in an Electronic Health Record (HER) data system maintained at HCN. EHR data were merged with provider gender obtained from a credentialing database and with data from a short organizational survey administered to the Medical Directors of the CHCs. Descriptive statistics, chi-squared analysis, and multiple logistic regression were used to examine Pap smear screening rates for women (n=71,234) in relation to a variety of patient, provider and organizational variables.

Younger, Hispanic and insured women were most likely to have had a screening in the past three years compared to older, white non-Hispanic and uninsured women. Among providers, patients who received care from female providers generally had higher Pap smear compliance rates, but these findings differed by patient insurance and race/ethnicity group. Organizational factors that appeared to be associated with higher Pap compliance rates included diffusion of an EHR system, implementation of “Care Model Principals”, and having recently implemented a Pap smear screening process improvement project.

Results demonstrated that multi-level factors, operating on the patient, provider and organizational levels, contribute to Pap smear compliance among women seen at CHCs. Results suggested that improving screening compliance within this population of women requires interventions that are ecologic in scope, incorporate targeted education to high-risk women and providers, and include organizational strategies that can optimize care delivery at point-of-care.

Dedication

I dedicate this work to my parents, Errol and Gladys Cook, for teaching me the importance of good, hard work.

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A great number of people have contributed to this work.

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I would also like to acknowledge Health Choice Network's Dr. Tony Amofah, Terisa James, Margarita Ollet, Kevin Kearns and members of the HCN Clinical Committee for your support.

I am very thankful to the University of Miami, Miller School of Medicine, School of Epidemiology and Public Health faculty and administration for admitting me to this scholarship program. This really was an unbelievable opportunity and I thank you for this tremendous gift of knowledge.

I sought a Doctorate degree in Epidemiology in order to gain the skills and credentials to contribute meaningfully to community-based, public health research. As a new Doctor of Epidemiology, I realize how much I still have to learn in order to make a significant impact in public health. Thank you, in advance, to my Committee for your future guidance and support. I am fortunate to have such knowledgeable and accomplished colleagues.

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CHAPTER 1 - INTRODUCTION

Background and significance:

Cervical cancer, a malignancy of the ectocervix, is a largely preventable disease. The incidence of cervical cancer has dropped dramatically over the past three decades, largely as a result of widespread adoption of the Papanicolaou test, also called the “Pap smear”.¹ Despite this, in 2008, it is expected that nearly 11,170 women in the United States will be diagnosed with cervical cancer, and approximately 3,870 will die from the disease.² Black women and Hispanic women shoulder a disproportionate burden of the disease. Hispanic women have a 1.9 higher incidence rate of cervical cancer and a 1.5 higher morbidity rate from the disease than white women.³ Black women tend to be diagnosed with cervical cancer at later stages, when the prognosis for survival is poor.⁴ Underutilization of routine Pap smear screening accounts, in large part, for these disparities. Routine Pap smear screening can detect pre-cancerous cervical lesions, or dysplasias, reducing the risk of disease onset and progression.⁵ For the purposes of this research, regular screening is generally defined as one Pap smear every three years for women ages 21 to 64.

The primary risk factor for cervical cancer is oncogenic strains of the Human Papillomavirus (HPV), a sexually transmitted infection. This infection acts synergistically with a number of social and behavioral determinants, including income, access to healthcare, level of educational attainment, tobacco exposure and cultural factors, to induce cervical carcinogenesis. New vaccines are currently being introduced to the market that can help protect women against HPV 16 and HPV 18, the two most prevalent oncogenic strains of the virus in the United States. However, there is limited

potential of these vaccines to completely eliminate cervical cancer morbidity and mortality in coming decades. Most notably, the vaccines do not protect women who are already exposed to the HPV virus or women who initiated sexual activity prior to vaccine availability or who are infected with HPV strains not included in the vaccine at this time. Regular Pap smear testing remains the most viable option to protect these women, as well as other women who do not have access to the vaccine or choose not to be vaccinated for personal reasons, from cervical cancer and associated morbidities.

HealthyPeople 2010 has identified cervical cancer screening as a focus area for public health improvement.⁶ The target for screening compliance by 2010 is 90%. In 2005, it was estimated that 78% of women 18 years old and over received Pap smear screening. Rates by race/ethnicity were 74% for Hispanics, 80% for Blacks and 79% for Whites.⁷ Alarmingly, these rates represent a decrease from those reported in 2003, demonstrating the need for ongoing research in order to understand and address issues regarding non-compliance with Pap smear screening.

Disparities in Pap smear screening rates

There has been a plethora of research studying factors contributing to Pap smear screening compliance at the patient level. Results of this research demonstrate that the issues are complex and include a host of variables, both alone and in interaction with one another. Research conducted at the provider level is sparse, and there is an even greater paucity of studies regarding the organizational determinants of Pap smear screening.

Patient variables that have been demonstrated to contribute to Pap smear screening behavior include both extrinsic and intrinsic determinants. Extrinsic variables include: include lack of insurance, lack of a regular care provider or usual source of care,

acculturation, socio-demographic factors, and literacy of the English language.^{6,8-22}

Interestingly, there is debate regarding the role of race/ethnicity as a significant independent predictor of cervical cancer screening and survival.^{9,13,13-15,19} Intrinsic motivators identified as determinants of screening compliance include cultural beliefs and perceptions of vulnerability.²³

In terms of provider characteristics, few studies have investigated the role of provider characteristics on cervical cancer screening rates.²⁴⁻²⁶ An important study published in 2005 analyzed data from the 2000 National Health Interview Survey (NHIS).²⁶ Results suggested that a lack of physician recommendation for Pap smear was a significant contributor for women not having had a Pap smear. When such data were stratified by health insurance status, 16.8% of women who did not receive a Pap smear indicated the “doctor didn’t order it” as the primary reason for not being screened.²⁶ Given that doctor recommendation is a relatively important determinant of screening compliance, it stands to reason that physician characteristics themselves, may similarly be an important influence of screening compliance among underserved women.

Knowledge about the relationship between organizational characteristics and Pap smear screening is also limited. A comprehensive literature review found only one article that specifically investigated organizational characteristics associated with cervical cancer screening compliance in primary settings. Goldzweig et al (2004) reviewed cervical cancer screening rates at 144 Department of Veteran Affairs (VA) primary care clinics.²⁷ A major finding of their cross-sectional study was that screening rates were higher in clinics where medical staff perceived a greater organizational commitment to the delivery of quality care. Another study reviewed colorectal cancer screening rates in

VA primary clinics.²⁸ Results of this analysis found that organizations that had greater clinical support resources, defined as adequately equipped exam rooms and sufficient computer access had improved screening rates. Such findings underscore the importance of considering organizational characteristics in the investigation of variables explaining differences of Pap smear rates in primary care, as was also explicated by the 2001 Institute of Medicine (IOM) Paper entitled “Crossing the Quality Chasm: A New Health System for the 21st Century.”²⁹ A core premise of this paper was that quality care improvement cannot be achieved by initiatives focused solely at the patient or the provider level. Rather, the IOM urged health care providers to focus on using new and advanced technologies, such as the use of health information technology, to redesign administrative and clinical process that may improve the efficiency and effectiveness of care delivery. Through this ecologic approach towards changing systems of care, the IOM envisioned measurable improvements throughout the entire American health care delivery system.

Overview of Community Health Centers

Community Health Centers (CHCs) provide an excellent venue in which to examine multi-level determinants of Pap smear screening disparities. CHCs serve as the primary care safety net for the poor and underserved, those individuals most likely to be affected by adverse cervical cancer outcomes. The overarching goal of the CHC program, created during the “War on Poverty” in the 1960s, is to “provide affordable, high quality and comprehensive primary care to medically underserved populations, regardless of their insurance status or ability to pay.”³⁰ 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 U.S. Department of Health and Human Services.³¹ the number of Community Health Centers across the U.S. has continued to increase as national initiatives to improve access and quality of care and to reduce health disparities have received increasing attention through such programs as Healthy People 2010. There are approximately 1,000 health centers located in a number of low-income urban and rural areas across the United States. These centers currently provide comprehensive primary, behavioral, and dental care to over 16 million Americans. Nationally, 65% of CHC patients are from minority groups, and 85% either have no health care insurance or are covered by public insurance.³⁰

Health Choice Network's (HCN) is a community-based, not-for-profit, 501(c)(3) organization formed in 1994 by CHCs in South Florida to reduce costs, improve value, and improve outcomes and access to care through working together.³² The founding members of HCN discovered that by integrating resource-heavy services, such as billing and information technology, they could realize the advantages and expertise of a large health system, while retaining independent governance. Early initiatives of HCN included centralized billing, managed care contracting, community outreach and health promotion through a faith-based collaborative. HCN also actively participates in many local and State committees, including the Governor's Health Information Advisory Board and the Community Access Project in an effort to reduce health disparities and improve the overall health of underserved population groups

In 2003, HCN received a \$4 million federal grant to implement EHR in all its Florida centers. HCN received national recognition for this activity and, in the past five years, has grown to 54 member CHCs in Florida, Utah, New Mexico, Kansas and

Hawaii. It is expected that all CHCs will be operational on all system components including clinical documentation, lab interface, prescription writer and clinical tasks by 2010. As a result of these initiatives, HCN will have comprehensive primary care medical data on nearly one million patients, many of whom bear the brunt of health disparities in the United States. This powerful database will offer the potential for multiple venues of health care research among a population often excluded from study.

Quality Improvement, Pap Smear Screening and Community Health Centers

Over the past few years, there has been some research performed in Community Health Centers which has focused on quality performance.³³⁻³⁸ This research has suggested that vulnerable populations seen at CHCs receive better preventative care than low-income and ethnically/racially similar populations not served by CHCs, when measured across several performance indicators including cervical cancer screening.

The HCN Clinical Committee, comprised of Medical Directors meets regularly to share best practices for quality improvement across CHCs. The Clinical Committee selected Pap smear screening compliance as a core quality measure in 2007 and 2008 to measure for improvement. Selection of this measure was based on a review of health outcomes and performance measures proposed by: Healthy People 2010; the United States Preventative Task Force; the Bureau of Primary Health Care's Health Disparity Collaboratives; and the Human Resource and Services Administration's (HRSA) Core clinical measures dataset. These are the typical sources used by HCN to define health process and outcome measures.

Available cross-sectional data on cervical cancer screening rates in CHCs suggest that cervical cancer rates at CHCs surpass the Healthy People 2010 goal of 90% but fall

short of the Health Disparity Collaborative goal of 70%.^{34,36} However, these measures were derived either through sample chart review or patient self report, and not through the population based analysis utilized in this study. This study used health record data on women seen across 10 Florida CHCs in HCN. The data sources for this research included a comprehensive electronic health record (EHR) database which stores health record data on all women, a provider credentialing database and an organizational survey. Through this population-based approach, all women who met the inclusion criteria, rather than a sample of women as in previous studies, were included.

Our primary hypothesis was that Pap smear screening compliance in a large vulnerable population would be related to a number of multi-level factors including patient, provider and organizational variables. We had three, related specific aims.

Aim 1: Among a large cohort of vulnerable women, to explore the association of patient-level characteristics such as race, ethnicity, insurance status and age on Pap smear screening compliance. Our corresponding hypotheses were as follows:

1. Pap smear screening rates in CHCs would be below the HealthyPeople 2010 target of 90%.
2. After controlling for age and ethnicity, there would be a significant difference in Pap smear screening rates among women who are insured compared to women who are underinsured or uninsured.
3. After controlling for age and insurance, there would be a significant difference in Pap smear screening rates among women who are Hispanic compared to women who are white non-Hispanic and black, non-Hispanic.

Aim 2: To examine the relationship between healthcare provider characteristics (e.g. gender, languages spoken, medical degree and Pap smear screening rates across the 10 Community Health Centers. Our corresponding hypothesis was as follows:

1. After controlling for CHC, Pap smear screening compliance among patients seen by providers who are female, speak foreign language(s) and have mid-level (Nurse Practitioner, Physician Assistant) degrees would be higher than among providers who are male, speak only English and have a Medical Degree or are a Doctor or Osteopathic Medicine.

Aim 3: To identify organizational characteristics, such as EHR diffusion and care process redesign, which may predict differences in Pap smear screening rates between Community Health Centers. Our corresponding hypothesis was as follows:

1. Pap smear screening compliance among patient seen at CHCs that have recently implemented care process redesign or who are fully functional on EHR would be higher than among patients seen at CHCs that have not implemented care process redesign and do not have a fully functional EHR system.

Conceptual Framework

This research was guided by a conceptual framework developed by Zapka et al (2003) that characterizes cancer care, including cancer preventive screening, from an ecologic, or multi-level, perspective.³⁹ The Continuum of Cancer Care (QCCC) framework incorporates components of the Behavioral Model of Utilization developed by Anderson, Aday and colleagues.⁴⁰, the Precede-Proceed Model developed by Green and Kreuter.⁴¹ and the Care Model developed by Wagner.^{42,43} The basis of the QCCC is that

meaningful cancer care improvement is driven by a complex number of factors operating across multiple levels of influence, including the patient-level, the provider-level, the organizational-level and the community-level. The ecologic orientation of the QCCC framework provides a model for systematically considering multi-level factors that may contribute to differences in the delivery of quality of care, including Pap smear screening rates across an underserved cohort of women seen at CHCs. By reviewing Pap smear screening from an ecologic perspective, this study sought to identify the significant contribution of a number of variables that can then be addressed through interventions to improve quality care.

Significance

Community Health Centers, working in concert with HRSA, are dedicated to meeting and surpassing Healthy People 2010 targets. To reduce disparities in cervical cancer incidence and mortality, the screening compliance target adopted by HCN CHCs is 90%, as targeted by HealthyPeople 2010. This study sought to investigate patient, provider and organizational factors that might explain lower screening compliance among a large cohort of underserved women, and to inform interventions to improve screening compliance within this population. Finally, this research sought to develop a methodology whereby EHR data could be used to conduct meaningful health disparity and quality improvement research in primary care venues.

Incorporating the role of health care provider characteristics represented an innovative approach to health disparity research in primary care. A more thorough understanding of healthcare provider characteristics as they relate to cervical cancer screening rates within the CHC environment could help frame healthcare provider-based

interventions, such as provider educational programs and revision of job descriptions, to improve the delivery of quality care.

The inclusion of organizational characteristics on Pap smear screening was consistent with the IOM's premise that meaningful improvements on health care delivery must consider the potentially broad impact of health information technology and care delivery redesign on improving health care and reducing health disparities.^{28,33,44} Evaluation which demonstrates a positive association of health information technology innovations and quality improvement initiatives (such as care process redesign) to Pap smear screening rates can provide important information that can be used to garner support for such initiatives by policy-makers and health care executives.

Traditionally, research describing disparities in cervical cancer screening is often based on self-reported survey data among women in the general population or among managed care organizations.^{8,11,11,15-18,20,22,25} Not only does the study of these populations exclude the population most at-risk of non-compliance with Pap smear screening, but there are also biases introduced when using self-report. Conducting this research in a large cohort (N>50,000) of underserved women while using EHR data reduced some of the self-report bias and improves validity of the results. Furthermore, as informatics (e.g. ability to extract valid data) becomes more sophisticated and more accurate, conducting research using large EHR systems has the potential to be less resource intensive (e.g. lower cost) than phone surveys and chart review, less intrusive to the health organization since it can be conducted off-site, and less intrusive to patients. Furthermore, as EHR systems expand, researchers have the opportunity to adjust for a potentially unlimited number of confounding variables (such as patient demographic

characteristics and co-morbidities) that might have been too laborious in a chart review or self-report design. Using EHR data for research requires researchers to take extra measures to protect patient privacy due to file sharing, and to dedicate extra resources to ensure a high level of data validity testing. However, with careful application and clear methodology, EHR opens the door and expands opportunities to understand determinants of Pap smear screening compliance and explore research in other areas of health care disparities.

Summary

In summary, studying the role of patient, provider and organization variables on the Pap smear screening compliance using the QCCC framework offers a greater understanding of factors associated with cervical cancer health disparities. This research, conducted across CHCs in Florida, provided specific insight regarding effective interventions that may improve Pap smear screening rates within the CHCs studied. In addition, this research suggested a model for investigating variables contributing to disparities in other disease states, thereby providing a framework in which to identify opportunities for improvement throughout the CHC environment.

CHAPTER 2 - METHODOLOGY

Developing the Research Questions

The research questions included in this study were selected as part of the dissertation work for a doctorate degree in epidemiology. The specific items considered in framing the questions were as follows:

1. Identify an area of need that is of interest to the medical community practicing in Community Health Centers, where the author is employed as the Assistant Vice President of Clinical Data and Evaluation.
2. Engage in academic research that will help to build capacity for a new research division at HCN.
3. Select an area of study that will add significant contribution to understanding disparities in the delivery of health care in CHCs and that will identify opportunities for meaningful interventions to reduce health disparities..
4. Design a study that could be answered using data from a large electronic health records dataset maintained at Health Choice Network, one of the largest integrated networks of CHCs in the United States.
5. Satisfy the requirements for graduation of a doctoral degree in epidemiology.

The selection of Pap smears as an area of study satisfies the considerations above. Nicole Cook, the author of this dissertation, serves as the Assistant Vice President of Clinical Data and Evaluation for Health Choice Network, Inc. Pap smear screening is an important health care performance measure that is reportable to the Human Resource and

Services Administration (HRSA) by CHCs. Pap smear screening is also one of several performance measures selected by the HCN Clinical Committee for ongoing monitoring of quality improvement.

The Clinical Committee recognized that Pap smear screening is often considered a measure of true disparity in health care. Pap smears are a relatively quick, low-cost and effective screening test that can identify pre-malignant lesions, reducing the risk of carcinogenesis in women adequately treated for detected abnormalities. Moreover, uninsured women, ages 18-64, can receive free pap smears through the National Breast and Cervical Cancer Early Detection Program (NBCCEDP), which reduces many barriers to care.²⁴ In fact, several of the CHCs included in this research are providers in the NBCCEDP.

This research moved away from traditional epidemiologic inquiry and incorporated focus on other variables beyond patient characteristics. Incorporating an expanded perspective of provider and organizational level factors enhanced the study of health disparities and was consistent with both the QCCC framework and the IOM findings. In terms of the relevance to CHCs, the expanded focus provided a broader understanding of factors associated with Pap smear screening compliance so that meaningful and comprehensive interventions can be designed to improve Pap smear screening rates among women served by CHCs.

Using EHR data to perform this study of Pap smear screening compliance in CHCs was optimal. The EHR system stores patient registration information (including demographic data), claims data, lab data and clinical history. Once the labor-intensive task of identifying fields to extract in terms of patient characteristics, Pap billing codes

and Pap fields in the electronic chart documentation module, the study data file including 71,234 women was accomplished within 3 hours of processing time. Although there are limitations (discussed in more detail below) with using EHR data for this study, it was a reasonable approach and did present a practical methodology that could be replicated in future research.

Literature Review

A comprehensive literature review was performed to understand current thinking related to national pap smear screening rates, disparities in pap smear screening rates, including risk factors for not screening, and delivery of care by Community Health Centers, the nation's safety-net primary care provider. Ovid Medline through the Calder Memorial Library was used to perform the literature searches. The literature search used the following criteria: English language", and "humans". Specific searches were conducted on the following keywords identified in Table 2:1.

An initial literature review was conducted as part of the dissertation proposal development. An additional review was conducted in January 2008 to ensure that any recently published relevant articles were included.

EHR System Data

HCN maintains a comprehensive EHR system for all CHCs in the network. Data stored in the EHR system includes: patient registration information (e.g. demographic and socio-economic data); claims information (e.g. billing history and services provided); laboratory data (e.g. types of tests ordered and results); prescription data (prescriptions ordered by the provider at the time of visit or via phone); and comprehensive electronic chart documentation captured by the providers at point of care. Each patient seen across HCN has a unique patient number

assigned by the EHR system at registration. These data are stored on a sequel server at HCN by CHC. The system is backed-up regularly and supported 24/7 by live personnel. The EHR modules accessed to conduct this research are those identified in Table 2.2.

Credentialing System Data

HCN acts as a vendor for many managed care organizations that contract with the network to provide care to members at individual CHCs. Through this arrangement, HCN performs delegated credentialing functions, which includes creating credentialing files for review by Medical Directors of the respective CHCs. The credentialing process incorporates the review of professional and personal criteria of the provider being credentialed including: age; gender; language spoken; medical school degree; malpractice information, and several other items. Credentialing data are entered, accessed and extrapolated via a separate credentialing software system stored at HCN on a separate server. Currently, there are approximately 400 primary care and OB/Gyn providers, including mid-level providers (ARNP, Physician Assistants), maintained in the credentialing database.

Credentialing variables initially selected for use in this study included provider specialty gender, primary languages spoken, ethnicity, and type of medical degree. It was originally anticipated that National Practitioner Number (NPI) would be used to match provider data from the EHR database research file with provider information from the Credentialing Database. An NPI number is a unique provider identifier that was developed by the Centers for Medicare and Medicaid in conjunction with the development of a Provider Registry. Providers were mandated to apply for NPI numbers by December 31, 2007. However, there were inconsistencies in the program which

resulted in some providers having multiple NPI numbers, and some providers not being assigned unique identifiers. As a result, the initial match between the credentialing database and the EHR database research file only resulted in a 5% match. To improve the match, a data analyst, who was not associated with the study, merged the Last Provider Seen name with the credentialing database using an “is like” merge. This resulted in a 42% match between the credentialing database and the EHR database research file. The provider name was removed from the research file prior to being used by the study investigator.

One potential reason explaining the low match rate is that HCN, unlike managed care organizations, does not use a gate-keeper model whereby patients are assigned to one provider who is responsible for managing all of that patients’ care in the organization. Alternatively, the HCN Clinical Committee has agreed that every primary care provider who sees a patient assumes responsibility for compliance with preventative care, including cancer screenings. However, when the data analyst used the criteria of “last provider seen” based on the provider responsible for claim processing, numerous errors arose. First, the EHR billing system that maintains provider billing information has not been sufficiently maintained over time. There are duplicate entries for unique providers, sometimes with each entry having a different spelling, name order and/or spacing. This created problems when trying to match to the credentialing database using an “as like” match. Second, if the patient came for a visit and on the same day for a laboratory test, the name of the lab assistant would populate the last provider seen field. Third, the credentialing database only included active and non-active providers as of January 2007. Therefore, providers who saw patients in 2005 or 2006 and left the CHC

since that time could not be matched. These issues reduced the patient file from 63,934 to 27,022. Cross-tabs of missing patients revealed similar compliance rates and trends by age, race/ethnicity and insurance. However, the missing cases may have been meaningful in the multi-variate model and remained a concern throughout the study. This limitation is discussed in greater detail in the discussion section of Paper Two.

Organization Survey Data

The organizational questionnaire was developed to capture variables of interest at the organizational level that could not be derived from the electronic health records database. The organizational tool used in this study was developed to be as brief as possible, while still capturing critical information needed for the research. The six questions included on the organizational survey were derived from key concepts identified in the literature and ongoing initiatives within the CHC environment. Currently, the author facilitates the Clinical Committee on a monthly basis, and is familiar with the time constraints and the number of responsibilities the Medical Directors have. As a result, she designed the Survey to provide Center-specific information that she completed for them in advance in order to focus their attention on Pap smear screening rates at their center. The bottom half of the survey tool asked the Medical Directors to provide information on EHR integration and care process redesign within their centers. This is information the Medical Directors should know, and it was believed that they should be able to respond to the survey easily and thoroughly.

The survey was administered during the October 2007 Clinical Committee meetings. Providers from four CHCs did not attend the meeting, so the questionnaire was sent to them via secure email over the HCN server. One Medical Director did not

respond to the survey despite two reminders. As a result, this CHC was dropped from Paper Three. The impact of this dropped CHC is likely not important, as it was a small center which only accounted for 4% (n=2,612) of the final research file.

Inclusion and Exclusion Criteria

Inclusion criteria were adopted from the HRSA Core Clinical Measures (CCMS).⁵ In 2005, HRSA created the Healthcare Quality Council. One outcome of this group was to develop a core list of process and outcome measures that would be used consistently across all HRSA funded programs, including CHCs, for quality measurement. In developing the CCMS, HRSA reviewed nationally endorsed measures include National Committee Quality Assurance (NCQA), National Quality Forum (NQF) and the Ambulatory Care Quality Alliance (AQA). The cervical cancer screening measure selected by HRSA aligns with NCQA, NQF and AQA and is consistent with the United States Preventative Task Force recommendations for cervical cancer screening. In summary, the recommendations state that Pap smear screening is recommended at least once every three years for women ages 21 to 64.

The data specifications used for this research follow those outlined in HRSA's Bureau of Primary Health Care's (BPHCs), Uniform Data System (UDS) manual proposed in 2008. CHCs that receive HRSA funding must report on a series of financial, utilization and clinical measures annually to HRSA through the UDS reporting system. The UDS manual provides specific direction in terms of inclusion and exclusion criteria, claims and laboratory codes and time periods that CHCs must adhere to in order to report accurately and consistently. All of the CHCs included in this study are also required to report the Pap smear screening measure for 2008 to UDS (will be submitted in February

2009 for the 2008 reporting year). Therefore, this research presented an excellent opportunity to validate preliminary reports and identify data reliability issues.

HRSA specifies that all women ages 21 to 64 with at least one medical encounter during the reporting period must be included in determining compliance with Pap smear screening. The measure specifications indicate that women are compliant with cervical cancer screening if they received at least one Pap smear during the measurement year or two years prior to the measurement year. For the purposes of this research, only the most recent Pap smear test was used to satisfy the criteria of a Pap having been performed during the measurement year or during the two years prior to the measurement year. According to the HRSA criteria, identification of a Pap test having been performed is satisfied via CPT billing code or a note in the chart documenting the name, date, and results from a test performed by an outside provider.

Exclusion criteria based on the HRSA criteria included women who had a documented hysterectomy. However, upon initial review of the research file, two of the Centers had their EHR system designed to default to negative for “hysterectomy”, resulting in hysterectomy rates of 13% and 11% respectively. Among the other eight centers, hysterectomy rates varied from 0.5% to 4%, possibly indicating inconsistent use of the “past hysterectomy” field. The average hysterectomy rate in the initial research database of 71,234 women was 4% (n=2,912). Further analysis on this issue revealed that the rate of Pap smear compliance among women with so-called hysterectomies was consistent or *higher* than among women without a documented hysterectomy within most centers, raising additional concerns that this field was not appropriately used by providers. Since this issue could not be resolved retrospectively without full chart review

confirming or denying the hysterectomy, this exclusion was not applied to the analysis. After the file was cleaned for missing variables, the final research file included 63,954 women, including 1,929 (3%) of women with an EHR field indicating “hysterectomy.” Additional analysis of the 1,929 women with documented hysterectomies in the EHR did not highlight any differences from the larger population in terms of race/ethnicity, age or insurance. In summary, inclusion of these women in the research file is reasonable and should not have changed the results in any meaningful way.

Data Linkage

The first step in creating the final research data file was to apply the inclusion and exclusion criteria (restricted to females seen in 2007 for at least one primary care visit) to the EHR database. The data were extracted by the Database Administrator/ Informatics Manager who used Sequel code to write the file specifications. The research file included all women seen in 2007 for at least one primary care visit, CHC, demographic and socio-economic variables of study, Pap smear compliance based on last three years from the last date of service in 2007, and the last provider seen. The lab module, the claims database, the patient registration system and the chart documentation module were queried at this stage too. The specific data fields that were extracted from each module are outlined above in the EHR System Data section.

The next step was to link this file with the credentialing database as described above. The last step in creation of the file was to link this file with the organizational survey by inserting, by patient, the organizational variables of interest. The final research file was a “flat file” of patient, provider, and organizational variables listed by patient number.

Revision to Aim 2

As previously mentioned, this study was intended to cover three areas related to Pap smear compliance: patient-level risk factors, provider characteristics, and organizational level determinants. The provider characteristics initially selected for study included: provider gender, provider languages spoken, type of medical degree, and provider specialty. These were based on those fields that the author understood to have been captured consistently by credentialing staff. (The author supervised the credentialing department in 2006 and was instrumental in implementing the software). We were able to successfully capture these variables and then merge them into a dataset for analysis. However, upon first review of the data we identified that type of medical degree was missing from several providers. We then performed an impact analysis to assess the importance of medical degree. We determined that medical degree did not affect the relationship of other variables to the binary outcome of a woman having received a Pap smear. Based on these steps we decided to eliminate provider medical degree from the study. We then proceeded to analyze the data by provider gender, provider languages and provider specialty. While descriptive statistics appeared to show acceptable data for this analysis, the number of high interaction variables that were produced from the regression model raised concern. Upon further review, it was determined that there was not enough variability by individual center to model provider gender, language and sub specialty. Only two centers (representing less than 10,000 patients) had enough variability (cells >0) across all three provider variables for analysis.

We explored the possibility of completing the analysis only using provider gender. There is substantial literature investigating the role of provider gender on

primary care service delivery, including Pap smear screening utilization.⁴⁵⁻⁵³ It was anticipated that this analysis would add to this knowledge while presenting a unique perspective on a low-income, largely uninsured and racially/ethnically diverse population. Seven CHCs (representing 27,022 patients) had enough variability in provider gender to produce a robust analysis. While this final direction differed dramatically from our intended approach of analyzing provider variables on Pap smear screening utilization, our findings increased our knowledge of Pap smear disparities among an underserved CHC population.

Data Confidentiality

Data confidentiality was ensured in creating the final research file. Patient identifiers were not included in the initial data file pull from EHR. The data were initially pulled by patient number by the Informatics department at HCN under the direction of the Database Administrator. All patient and provider identifiers were removed prior to completing the final research file for analysis by the Project Investigator.

IRB Consent

This research was approved as Exempt by the Institutional Review Board at University of Miami (UM). An Institutional Review Board (IRB)/ Independent Ethics Committee (IEC) Authorization Agreement was signed between Health Choice Network and the University of Miami indicating that HCN will rely on UM's IRB for review and continuing oversight of its human subjects research. This agreement was signed by both the UM Vice Provost and HCN's President and CEO in February 2008.

Data Limitations

There are several data limitations that must be discussed. While best practices are incorporated into health information technology training at HCN, it is recognized that each CHC is its own entity. As such, processes and procedures with regards to data capture may be differentially implemented across the CHCs in the study. For example, the capture of race/ethnicity may vary depending upon how thorough the admissions clerk is at patient registration. It is understandable that in a busy CHC, an admissions clerk may not take the time to understand if a black women has Hispanic roots and should be classified as Hispanic, or if she is, in fact, other Islander, Haitian or of mixed races and ethnicities. Therefore, miscoding of this variable is possible in the research file.

Another identified limitation includes the validity of Pap smear compliance among patients who received pap smears outside of the CHC and among patients who were offered, but refused, Pap smears. If a patient receives Pap smear outside the CHC, HRSA guidelines indicate that either a copy of the lab result or a note regarding the name, date and result of where the patient obtained the Pap smear be placed in the chart. However, we understand that the recording of Pap smears performed outside of the CHC may be maintained differently by different CHCs. Some may choose to document this information in a paper chart, others scan the Pap results and attach it to an electronic chart, while still others document Pap smears performed outside the CHC directly in the patient's electronic chart. For CHCs that do not document Pap smears performed outside the CHCs directly in the patient's electronic chart, the overall Pap smear compliance rate could be reduced because these Pap smears would not be captured via an electronic merge of data. If a provider used a free text option to indicate a Pap smear performed

outside the CHC, the Pap smear could have been missed by the free-text search performed by the informatics department when creating the research file. While the actual number of women who have Pap smears performed outside the CHC is small (estimated at less than 10%) inconsistent documentation of this field likely resulted in some underestimating of the Pap smear compliance rate.

Statistical Analysis Plan

The statistical analysis plan for this research was developed to achieve three major goals:

1. Describe the study population
2. Describe Pap smear screening rates by patient characteristics, by provider characteristics and across the ten CHCs by organizational characteristic.
3. Identify patient and provider variables which were significantly associated with pap smear screening.

Statistical analyses included descriptive, chi-squared, and multivariate logistic regression analysis. Statistical analyses were performed using SPSS, version 14 and 15 and SAS. The statistical analysis plan by Aim is identified below:

Aim 1: To determine the overall Pap smear screening rates by race and ethnicity across 10 Community Health Centers.

The statistical plan for Aim 1 was as follows:

1. Describe the overall population (aggregate of 10 CHCs) in terms of age group (21-45 and 46-64), race/ethnicity and insurance.
2. Determine the overall Pap smear screening rate across the ten CHCs.

3. Determine the frequencies and the crude odds ratios of screening versus not screening by age, race/ethnicity and insurance using logistic regression.
4. Determine the contribution of age, race/ethnicity and insurance in explaining women who were screened versus women not screened. Multiple logistic regression was used to model the relationship of the binary outcome and a set of independent variables (age, race/ethnicity and insurance status) The binary outcome was whether or not a woman has had a Pap smear test. CHC was tested as a potential confounder and found to be significant. Therefore, all models were adjusted by CHC facility.

Aim 2: To examine the relationship between Pap smear screening rates and characteristics of healthcare providers (e.g. gender, languages spoken, medical degree) across 10 Community Health Centers.

As previously mentioned, the direction of Aim 2 was revised to focus on provider gender. Due to limited variability by CHC, we were not able to assess languages spoken or medical degree. In addition, the number of CHCs included in this analysis was seven. The statistical plan for Aim 2 was as follows:

1. Identify differences in missing cases versus cases included in the provider analysis.
2. Determine the frequencies and the crude odds ratios of patients screened versus those not screened across seven CHCs by provider gender and patient race/ethnicity, insurance status and age..
3. Determine the contribution of provider gender in explaining screening versus not screening of patients while controlling for patient insurance, age and

race/ethnicity. Multiple logistic regression was used to model the relationship of the binary outcome and provider gender. All models were adjusted by CHC.

Aim 3: To identify organizational characteristics that may predict differences in Pap smear screening rates between Community Health Centers.

The statistical plan for Aim 3 was as follows:

1. Describe the characteristics of 10 CHCs in terms of size , race/ethnicity of patients, insurance status of patients, age of patients, EHR usage by providers, care system design initiatives, and Pap having been a quality or process improvement initiative in the past five years. There were no trends due to CHC size, so this was eliminated from the paper to reduce confusion.
2. Determine the frequencies of patients screened (CHC Pap compliance rate) across the 10 CHCs by 1) EHR diffusion, 2) care system design initiatives, and 3) Pap having been selected by the CHC as a quality or process improvement initiative in the past five years.
3. Create a composite of organizational variables for comparison to CHC Pap compliance rate for descriptive comparison.

Table 2.1: Table of Structured Literature Review

Dates of published articles included in search	Keyword searches
1995- current	<ul style="list-style-type: none"> ➤ Pap smear And Disparities or, ➤ Pap smear And Community Health/ Community Health Centers/ Primary Health Care/ Community Health/ Community Health Services ➤ Pap smear and quality improvement/ quality assurance/ health care ➤ Pap smear and electronic health records
1990 to current	<ul style="list-style-type: none"> ➤ Cervical cancer screening And Disparities or, ➤ Cervical cancer screening And Community Health/ Community Health Centers/ Primary Health Care/ Community Health/ Community Health Services ➤ Cervical cancer screening and quality improvement/ quality assurance/ health care ➤ Cervical cancer screening and electronic health records
1990 to current	<ul style="list-style-type: none"> ➤ Provider (characteristics) and quality improvement/ quality assurance/ health care ➤ Provider (characteristics) and Pap smear ➤ Provider (characteristics) and cervical cancer screening
1990 to current	<ul style="list-style-type: none"> ➤ Organizational variables quality improvement/ quality assurance/ health care ➤ Organizational characteristics and quality improvement/ quality assurance/ health care
2000 to current	<ul style="list-style-type: none"> ➤ Community Health Centers

Table 2.2: Electronic Health Record Modules Used in Research Study

Module	Variables
Patient Registration	<ul style="list-style-type: none"> ➤ Patient gender ➤ Patient age ➤ Patient race/ethnicity
Claims	<ul style="list-style-type: none"> ➤ Patient visit date ➤ Pap performed (CPT or dummy code) ➤ Patient insurance (based on payment of last claim processed) ➤ Provider (NPI number, name of last seen) ➤ Community Health Center ➤ Exclusion from study (documented pregnancy in study year)
Laboratory	<ul style="list-style-type: none"> ➤ Pap performed (order number from Quest/LabCorp or dummy code)
Electronic Chart Documentation (Omnidoc)	<ul style="list-style-type: none"> ➤ Hysterectomy ➤ Pap performed (documented via EHR Medcin code).

CHAPTER 3 - ROLE OF RACE/ETHNICITY, INSURANCE AND AGE ON PAP SMEAR COMPLIANCE ACROSS 10 COMMUNITY HEALTH CENTERS IN FLORIDA

Summary

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 prevent the onset and progression of cervical malignancies. This paper reports on findings of a cross-sectional study on the role of race/ethnicity, insurance, and age on Pap smear compliance for more than 60,000 women using pooled data across ten CHCs in Florida from a comprehensive electronic health record (EHR) information system. Results of this cross-sectional study indicated a strong association between race/ethnicity and Pap smear screening in CHCs. Among women 21-45 years-old, 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 previous studies have shown that Hispanic women are less likely to receive screening than their Black and white counterparts. This study highlighted 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.

Background

In 2008, it is expected that nearly 11,070 women in the United States will be diagnosed with cervical cancer, and approximately 3,870 will die from the disease.⁵ Black women and Hispanic women contribute disproportionately to cervical cancer incidence, morbidity, and mortality.^{3,4} Underutilization of Pap smear screening accounts, in large part, for these disparities. Routine Pap smear screening can detect pre-cancerous cervical lesions, or dysplasias, reducing the risk of disease onset and progression.

Since the late 1980s, a significant body of research has examined patient factors contributing to disparities in Pap smear screening compliance and cervical cancer disease outcomes. Such factors are generally well known and include socio-demographic factors, lack of insurance, immigration status, English literacy, cultural beliefs, perceptions of vulnerability, and lack of a usual source of care.^{6,8-17,19-23,54,55}

Research investigating the role of such factors has largely been derived from studies conducted either in insured population 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 used an integrated EHR system to understand the role of race/ethnicity among a large cohort (n=63,053) of underserved women seen in 10 Community Health Centers 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 Community Health Center patients and (2) to identify opportunities for quality care initiatives to improve Pap screening rates.

Community Health Centers (CHCs) serve as the nation's primary care safety net for the poor and underserved, those individuals most likely to contribute to adverse cervical cancer outcomes.³⁸ 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 health care insurance or are covered by public insurance.³⁰ Because care in CHCs are 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 and socioeconomic status.

Health Choice Network (HCN) is a health center controlled integrated network of 54 member CHCs in Florida, Utah, New Mexico, Kansas, Iowa, Nebraska and Hawaii. This study was conducted with the support and input of Medical leadership of 10 CHCs in Florida. Pap smear screening compliance is a Quality of Care indicator selected as a performance measure by HRSA. CHCs receiving federal funding are required to report on this measure in 2008. This study also supported the ongoing efforts of Medical Leadership at HCN by standardizing Pap smear reporting at a Network level, providing information for benchmarking, and identifying interventions that can help to improve screening rates and reduce disparities in disease outcomes among the population most at-risk of developing and dying of cervical cancer.

Methods

Population. We used 2007 data from HCN's EHR system, a comprehensive 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 in one central location. Variables selected from the database included: CHC where medical care 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 at this point in time, included income level, number in household, primary language and marital status.

The ten CHCs were all from Florida; they were selected for the study based on the level of EHR integration and the number of years of claims history data available. The initial dataset included 72,134 women. There were 8,180 (11.3%) women who were missing information for either insurance or race/ethnicity, resulting in a final research dataset of 63,954. The proportion of patients from the 10 CHCs were as follows: 53% of the patients 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 old seen at least one time for a medical visit in one of the 10 CHCs during 2007. The criteria used to define the population inclusion and exclusion criteria were measure specifications outlined in the 2008 Reporting Manual for CHCs. .⁵

Outcome Variable. The outcome variable was whether woman had or did not have a Pap smear within the past three years. Having had a Pap smear within the past three

years was confirmed by one of two methods: (1) a Pap smear billing code in the patient claims history module of the Electronic Health Records database, or (2) documentation made by the provider 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. 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 $p < 0.10$ 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. Overall, Hispanic women were the most likely to be compliant with Pap smear screening. In addition, Pap smear compliance rates decreased with increasing age. Pap smear compliance rates were similar for both insured and non-insured women. (Table 3.1)

The chosen model for estimating the odds of having received a Pap smear included two pairwise interactions: insurance status by age ($p < 0.001$) and race/ethnicity by age ($p < 0.001$). Race/ethnicity was a significant predictor of receipt of Pap smear screening, but its effect depended on age. Among women 21-45 years old, Hispanics were two times more likely to receive a Pap smear than whites (OR=2.08; 95% CI=1.96, 2.21). Black women were 1.45 times more likely to receive a Pap smear than whites (OR=1.45; 95% CI=1.36, 1.54). Among women 46-64 years old, the trends were similar, though not as strong as for younger women, and also reached statistical significance at the .05 level. Hispanic women in this age group 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); and blacks 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). 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 46-64 years-old women, a smaller, but statistically significant, 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, the 21-45 age group had a 2.21 greater chance of having received a Pap smear than the 46-64 yrs age group (OR=2.21; 95% CI=2.03, 2.38). Among insured Hispanic women, the 21-45 age group had a 2.13 increased likelihood of having received a Pap smear than the 46-64 yrs age group (OR=2.12; 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 integrated EHR system. This study revealed that women from racial/ethnic minority groups, women who were insured, and women who were younger (age 21-45), were more likely to receive Pap smear screening when compared to white women, uninsured women and older women (age 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 21-45, having insurance significantly 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). The role of insurance in explaining health disparities requires special consideration when studying CHCs. Since CHCs exist to serve women regardless of ability to pay, we did not expect to find a significant difference among insured and uninsured groups. Therefore, the finding that younger insured women were more likely to be screened than younger

uninsured women is significant and requires further investigation within the context of CHCs.

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 have a higher prevalence of cervical cancer than white women.^{56,57} 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.⁵⁸ Our results could be partially due to the unique mix of Hispanic patients in South Florida, many of whom are from Cuba. While ethnic sub-group 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 revealed 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 this finding, and should be studied further, is the make-up of providers at the CHCs studied, many of whom are from racial/ethnic subgroups and bi-lingual.⁵⁹ As a result, it is postulated that providers in the CHCs included in this study may be more culturally competent than their non-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 supports 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 implemented at HCN, contribute to improving organizational infrastructure that aids in reducing health disparities for patients seen at CHCs

The overarching objective in conducting research such as this study in Community Health Centers is to identify factors contributing to health disparities that can then be addressed through the design and implementation of effective interventions. This research indicates that race/ethnicity, insurance status and age played a significant role in the receipt of Pap smear screening in the context of HCN. 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.

An important limitation of this study was the independent influence of the 10 CHCs included in this study, all of whom were from Florida. While the final model controlled for Center, 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. The model could be improved by an expanded analysis which includes additional centers from different geographic areas that have difference patient race and ethnicity composites, as well as adjusting for other potentially important organizational variables.

Another important limitation of this study was that not all of the CHCs included in the analysis were using a comprehensive EHR system. As a result, not all patients had an electronic patient chart so compliance with Pap smear testing was derived only through claims data. Internal analysis has suggested that data reliability and validity of Pap smear screening may be improved when information from the provider electronic clinical charting is used in addition to the claims data. Of the 10 centers, only four of them had all providers using full EHR capabilities during all of 2007. Therefore, it is likely that Pap smears compliance was under-reported due to those patients who had a Pap smear that was neither recorded in their electronic chart or for whom a claim was not generated.

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 eliminate Pap smear screening health disparities.

Table 3.1: Characteristics of Patients and Pap smear compliance rates across 10 CHCs in Florida, January 1, 2007 to December 31, 2007 (N=63,954)

	No. of cases	% ^a	% compliant
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 (years)			
Mean (SD)	40.5 (12.5)		
Median	40		

^a Column Percent

Table 3.2
Odds Ratio Estimates for characteristics of Patients associated with Pap smear compliance rates across 10 CHCs in Florida
January 1, 2007 to December 31, 2007 (N=63,954)

	No. of cases	% compliant	OR (95% CI) ^a
Effect of Insurance status by age group			
Age group 21-45			
Insured	12,808	59.8	1.45 (1.38, 1.51)
Uninsured	6,376	40.9	1.0
Age group 46-64			
Insured	25,675	57.1	1.10 (1.03, 1.17)
Uninsured	19,095	48.0	1.0
Effect of Race/ethnicity by age group			
Age group 21-45			
Black, non-Hispanic	11,025	54.0	1.45 (1.36, 1.54)
Hispanic	19,424	67.8	2.08 (1.96, 2.21)
White, non-Hispanic	58,034	40.0	1.0
Age group 46-64			
Black, non-Hispanic	7,414	40.3	1.13 (1.04, 1.21)
Hispanic	11,852	57.7	1.68 (1.56, 1.80)
White, non-Hispanic	6,205	31.5	1.0
Effect of Age group by insurance and race/ethnicity			
<u>Insured</u>			
White, non-Hispanic			
Age group 21-45	3,291	44.2	1.71 (1.57, 1.86)
Age group 46-64	2,235	33.1	1.0
Black, non-Hispanic			
Age group 21-45	4,816	59.1	2.21 (2.03, 2.38)
Age group 46-64	2,397	41.4	1.0
Hispanic			
Age group 21-45	4,701	71.5	2.13 (1.96, 2.30)
Age group 46-64	1,744	50.3	1.0
<u>Uninsured</u>			
White, non-Hispanic			
Age group 21-45	4,743	37.0	1.31 (1.20, 1.41)
Age group 46-64	3,970	30.6	1.0
Black, non-Hispanic			
Age group 21-45	6,209	50.1	1.68 (1.57, 1.80)
Age group 46-64	5,017	39.8	1.0
Hispanic			
Age group 21-45	14,723	66.6	1.62 (1.54, 1.71)
Age group 46-64	10,108	58.9	1.0

^aOR=odds ratio; CI=confidence interval. OR estimates are based on the logistic regression model which included 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.

CHAPTER 4 - ROLE OF PROVIDER GENDER ON PATIENT RECEIPT OF PAP SMEAR SCREENING IN COMMUNITY HEALTH CENTERS IN FLORIDA

Summary

The incidence of cervical cancer is highest among low-income, minority women, primarily due to underutilization of Pap smear screening, the best method available for early detection of disease. Community Health Centers are the Nation's primary care safety net, providing care to such women. This study examined the role of provider gender on Pap smear screening and tested interaction effects of provider gender and patient race/ethnicity, insurance and age on Pap smear screening among women seen across seven Community Health Centers in Florida. Results revealed that provider gender helped to explain differences in patient receipt of Pap smear. However, the role of provider gender varied by patient age and insurance status. Insured women who saw female providers had a higher chance of being compliant with Pap smear screening than insured women who saw male providers. Among uninsured women, the role of provider gender on Pap smear utilization was much less important. These results build upon the current understanding of Pap smear screening disparities in an underserved population and suggest the need for expanded research on the relationship between provider gender and screening. This knowledge is essential for improving the utilization of Pap smear screening in Community Health Centers in order to reduce the incidence of cervical cancer among women most at-risk of disease.

Background

The United States has made great strides in reducing cervical cancer morbidity and mortality over the past two decades.⁶⁰ However, all American women have not benefited equally from such strides. Racial/ethnic minorities and low income women

continue to shoulder a disproportionate burden of cervical cancer incidence, morbidity and mortality.^{3,4} The excess burden of disease among some groups of women is largely attributable to underutilization of Pap smear screening, the best method currently available for presentation and early detection of disease.^{61,62} Studies show that Pap smear screening is a complex behavior involving the interplay of socio-economic, demographic, cultural and behavioral influences.^{8,10,11,13-15,19,20,23,58,63,64} Underserved women, including those who are poor, uninsured and from racially/ethnic groups, face multiple challenges when trying to negotiate such influences. Not surprisingly, they are less likely to be screened, and more likely to be diagnosed with invasive cervical cancer. Research that examines barriers to routine screening within this population sub-group is essential for ultimately attenuating disparities in disease incidence and mortality.

Many poor and uninsured women receive care at Community Health Centers (CHCs) which are federally-funded, comprehensive primary care centers located in underserved urban and rural areas. Studies have shown that CHCs play a key role in reducing health disparities in the areas of prenatal care, diabetes management, and length of hospitalization by eliminating access to care barriers (such as transportation, language and insurance).⁶⁵⁻⁶⁷ Moreover, recent research revealed that Pap smear screening rates among women seen at CHCs are higher than those rates observed in the general U.S. populations, even when stratified by income, race/ethnicity and education.³⁴ This is likely due to the consumer driven focus of CHCs (the governance structure includes one half consumer representatives on the Board of Directors), as well as the priority assigned to the delivery of quality primary care services in response to Healthy People 2010.⁶

As of 2008, all CHCs are required to report annually on Pap smear screening performance as part of a new Federal initiative to monitor quality of care delivered at individual centers.⁵ In preparation for this new reporting, Medical Leadership at the Health Choice Network (HCN), an integrated network of CHCs in Florida, supported a comprehensive study of Pap smear screening utilization in order to identify opportunities for improvement. Study investigators reviewed Pap smear compliance for all women seen in 2007 across seven CHCs in Florida. Results revealed that only 51% of eligible women in 2007 were compliant with Pap smear screening according to HRSA guidelines which recommends a Pap smear every three years for women aged 21 to 64. The next step was to conduct inquiry into the determinants of Pap smear screening within the CHCs. In the first phase of inquiry, the association between Pap smear screening and patient risk factors, including race/ethnicity, insurance and age were investigated. Findings suggested that these patient characteristics were significantly associated with Pap smear screening disparities and should be included in further inquiry of Pap smear screening utilization in this population .

As part of the next phase of investigation, we sought to explore the role of provider gender on Pap smear screening. Previous studies have suggested that patients of female physicians are consistently more likely to receive a Pap smear than women seen by male physicians.^{49-52,68} To our knowledge these studies were conducted among nationally representative samples of women, who, on average, have better insurance coverage for preventive care than the largely uninsured population in this study. In addition, women seen in CHCs (which includes migrant and homeless patients) tend to be more transient and less likely to have a “medical home” than insured populations. Given

our largely uninsured and diverse population, we were interested in understanding if the role of provider gender would be consistent in our population. Furthermore, previous studies did not take into account the potential interaction effects between provider gender and patient socio-demographic variables. Considering the complex nature of screening disparities among underserved women, we wanted to explore if the role of provider gender on a women's receipt of Pap smear varied by patient socio-demographic differences. We took advantage of the patient socio-demographic variables available to us through an integrated electronic health record (EHR) database, which included insurance status, race/ethnicity and age, in order to test for interactions with provider gender. We hoped this approach would provide us with additional understanding of Pap smear utilization among the women in our study population.

Methods

This study used a dataset that was created by merging patient demographic and Pap smear compliance data from an integrated EHR with provider variables from a provider credentialing database. Both databases are located and maintained at Health Choice Network, a federally funded integrated delivery network of CHCs. The first step in creating the study dataset was to identify all women aged 21-64 who were seen in 2007, and to extract the following variables: patient race/ethnicity; patient age; patient insurance status, and the name/ID of the primary care provider most recently seen by the patient. Primary care providers included physicians, advanced practice nurse practitioners and physician assistants. This primary care provider name/ID was then matched to a provider credentialing database in order to extract provider gender (male vs.

female) and link the information into the patient dataset by individual patient. The final dataset included 22,997 women. All analyses for this study were conducted at the patient level.

It is important to note that the CHCs in this study do not operate a gatekeeper provider structure as used in the managed care environment. Under gatekeeper structures, a patient is assigned to one individual provider who is then responsible for coordinating all care delivered to that patient over time. In contrast, the CHCs included in this study employ a policy which assigns patients to the last provider seen during their most recent CHC visit. In this way, all providers are accountable for ensuring that the patient is compliant with recommended preventative care services and tests, including Pap smear screening, at every medical encounter.

Patient selection criteria: Woman aged 21-64 years old who were seen at least one time for a medical visit with a primary care provider in one of the seven CHCs during 2007 were included in the research file.

CHC Selection criteria: The seven CHCs selected for the study were based on their level of EHR integration, the number of years for which claims data were available, and the variability in provider gender data. All of the CHCs included in the study are from Florida. The proportion of patients from the seven CHCs are as follows: 56% of the patients are from four CHCs in Southeast Florida, 25% of the patients are from one CHC in southwest Florida and the remainder of the patients is from two CHCs in the greater Tampa area.

Provider selection criteria: Providers were matched to the patient file based on provider name and National Provider Identification number, a unique identifier assigned

to all providers by the Federal government through the Centers for Medicare and Medicaid Services. The final dataset included 22,997 unique patients, eligible for Pap smear screening in 2007. There were 58 unique providers (36 female and 22 male) who served these women across the seven CHCs.

Outcome Variable. The dichotomous outcome variable for the study was whether a woman had a Pap smear within the past three years, as stipulated in the Human Resource and Services Administration's recommended Pap smear screening guidelines.⁶⁹ Receipt of a Pap smear was confirmed by two methods: 1) having a Pap smear billing code in the patient claims history module of the Electronic Health Records database, or 2) the clinician having documented compliance in the patient's electronic medical record.

Independent Variables. We assessed the following predictors of Pap smear screening compliance: (1) provider gender (male or female); 2) patient health insurance coverage (uninsured or insured); (3) patient race/ethnicity (white non-Hispanic, black non-Hispanic, or Hispanic); and (4) patient age (21-45, 46-64). All analyses were adjusted for CHC facility in order to eliminate possible confounding by Center due to differences in patient insurance mix, patient race/ethnicity distribution or other potential confounders.

Analysis. The basic analytic framework for this study was logistic regression of the binary outcome of Pap smear. The main predictors of interest were provider gender and patient race/ethnicity, insurance, and age. All analyses were adjusted by CHC. Backward stepwise variable selection procedure was used with a $p < 0.10$ 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 16 and SAS version (9.1) were used to conduct the analysis.

Results

The study population of 22,997 women was ethnically/racially diverse, with over 80% of the population comprised of Hispanic or black, non-Hispanic women. In addition, 70% of the population was uninsured. Overall, Hispanic women were the most likely to have received a Pap smear in the past three years (59%), and white women were the least likely (31%). Insured and uninsured women had similar screening rates (51%). Pap smear screening rates among patients seen by male providers was 46.3% and among patient seen by female providers was 55%. (Table 4.1)

In Table 4.2, Pap smear rates are reported for provider gender by patient race/ethnicity, insurance and age. Hispanic women who saw female providers had higher screening rates than Hispanic women who saw male providers in all subgroups defined by patient age and insurance status ($p < 0.01$). Black non-Hispanic women who saw female providers also had significantly higher screening rates ($p < 0.05$), except for a subset of 21-45 year old uninsured women where no significant difference due to provider gender was observed ($p = 0.35$). Among white, non-Hispanic women, a significant difference in screening rates due to provider gender was observed only among insured women ($p < 0.01$). There was no significant difference due to provider gender among white non-Hispanic women who were uninsured ($p = 0.36$).

Table 4.3 shows the estimated odds of having received a Pap smear for combinations of categories of provider gender, patient insurance status, age and race/ethnicity. These estimates correspond to a model which included the following four

pairwise interactions: patient insurance status by provider gender ($p < 0.001$); patient age by provider gender ($p = 0.001$); patient age by insurance status ($p = 0.006$), and patient age by race/ethnicity ($p < 0.001$). Provider gender was an important variable for different categories of patient age and insurance status. There was no interaction between provider gender and patient race/ethnicity.

Provider Gender was a significant predictor of receipt of Pap smear screening, but its effect depended on both age and insurance status of the patient. In terms of patient insurance, results demonstrated that patients of female providers were more likely to be screened, but only among the insured population. Patient age was also important; however odds of Pap smear screening by the two age categories (21-45 and 46-64) trended consistently with younger women having a higher chance of being screened compared to older women. Among insured women who saw female providers, those in the 21-45 age group had a 1.77 (CI=1.57, 2.00) higher chance of being screened and those in the 46-64 age group had a 2.17 (1.89, 2.49) times greater likelihood of having received a Pap smear compared to women who saw male providers. Among uninsured women the role of provider gender was small or absent. Among younger uninsured women there was no difference in screening and among older uninsured women the role of provider gender was small (1.22; 1.10, 1.35).

Patient insurance was also associated with a greater likelihood of Pap smear screening; however, its role depended on both patient age and provider gender. Insured patients who saw female providers had a greater likelihood of having received a Pap smear than uninsured patients. This was consistent for both younger (1.88; 1.69, 2.08) and older women (1.55; 1.37, 1.76). There was no difference in screening due to patient

insurance for younger women who saw male providers. Among older women seen by male providers, insured women had a borderline significantly smaller likelihood of Pap smear screening compared to uninsured women (0.87; 0.77, 0.98).

The effect of patient race/ethnicity on the likelihood of having received a Pap smear depended on patient age. Among patients 21-45 years old, Hispanic women were 2.33 times more likely to be screened (2.10, 2.59) and black, non-Hispanic women were 1.56 (1.38, 1.76) times more likely to be screened compared to white, non-Hispanic women. Among 46-64 year old women, the effect of patient race/ethnicity was of less magnitude. Hispanic women were more likely than white, non-Hispanic women to have received Pap smear screening (1.64; 1.44, 1.86). However, older black, non-Hispanic women were only 1.16 times (1.37, 1.76) more likely than white, non-Hispanic women to be screened.

The effect of patient age on the likelihood of Pap smear screening depended on all three variables studied (patient race/ethnicity, patient insurance and provider gender). The general trend was that younger women were more likely to have received a Pap screening than older women. The age effect was stronger among both Hispanic and black, non-Hispanic women who were seen by male providers than among white non-Hispanic women. In general, these effects were slightly higher if these women were also insured. The effect of age followed the same pattern, but of less magnitude, among women seen by female providers. The specific estimates are reported in the lower half of Table 4.3.

Discussion

In terms of provider gender, insured women who saw female providers were more likely to comply with screening guidelines in CHCs. This finding was consistent among

both younger women and older women. However results were not consistent among uninsured women. Among older uninsured women, the association between provider gender and screening utilization was small (22%) while among younger uninsured women there was no difference in screening rates due to provider gender. These results show that provider gender by patient age, while significant, had only a small impact on the magnitude of the association between provider gender and patient insurance. Most important, these results demonstrate that provider gender is an important variable to consider in the study of Pap smear screening disparities, especially among insured populations.

This study did not include inquiry into the specific factors that contribute to provider gender differences in Pap smear screening. However, there are a number of published studies that have investigated differences in gender-related practices between male and female primary care providers..^{45,46,70} Results of these studies offer important insight that may help explain the findings from this study. For example, it has been repeatedly demonstrated that female primary care providers engage in more patient-centered communication than their male colleagues. This may suggest that the communication style adopted by female providers is more successful in persuading otherwise non-compliant women to complete recommended Pap smears. In addition, a literature review conducted by Roter, Hall and Aoki found that female primary care physicians engage in more positive talk, psychosocial counseling, and emotionally focused talk than their male counterparts..⁴⁸ They also found that patient visits with female primary care providers are, on average, two minutes longer than those male providers. These findings suggest that variations in Pap smear screening practices by

provider gender may be partly explained by differences in patient-centered communication and/or differences in visit length by female providers.

Of important note is that the association between higher patient Pap smear utilization and female providers was not consistent among uninsured women. This may point to the successful impact of Federal, state and local programs that specifically target the uninsured for Pap smear screening, such as the National Breast and Cervical Cancer Prevention Project.²⁴ and Project Screen.⁷¹ While we did not study the marketing of these programs to providers or their prioritization in CHC operations, it is possible that attention to such programs by all providers may serve to eliminate gender-related differences that might otherwise be present.

This study differed from most previous studies which were conducted among nationally representative samples of women or insured populations, in that our study population was racially/ethnically diverse and largely uninsured. Therefore, results of this study are relevant specifically to the population at greatest risk for cervical cancer. Given the concentration of women in this study (56% are from Southeast Florida, namely Miami-Dade County) extrapolation of these results outside this region is cautioned, though this study does build upon our knowledge of Pap smear screening utilization among a large, at-risk and racially/ethnically diverse population seen at CHCs in Florida.

Another possible limitation of this study was the number of patients from the initial patient data file that were eliminated from the final research dataset. The complete data file of patients who initially met the inclusion criteria for the study was 63,053 across 10 CHCs. However, 36,031 patients were eliminated because data entry inconsistencies prevented matching between the patient file and the provider credentialing database. In

addition, three CHCs (4,025 patients) were eliminated due to no variability in provider gender. The final research dataset included 22,997 patients. A comparison of women included in the study to women excluded in the study did not reveal significant differences in terms of Pap compliance rate, race or insurance. Therefore, our results from this analysis do not suggest concerns with study validity as a result of the missing cases.

A third limitation of this study was the restricted number of variables tested in the analysis. While the EHR system we used for this study contained information on other potentially important variables, such as patient language, household income, and education, we were concerned about the validity of this data across all seven CHCs. Individual CHCs have different methods of entering patient registration data and, upon review, we determined that the most consistent socio-demographic variables were those selected for inclusion in this study, namely patient race/ethnicity, age and insurance status. Similarly, we were also interested in testing the association of other provider characteristics on Pap smear screening, such as provider specialty and provider languages spoken. However, there was not enough variability within the seven CHCs to include these variables in our analyses.

Despite these limitations, findings from this study have important implications for understanding the role of gender on patient receipt of Pap smear screening. Our study revealed that underserved patients of female providers served in CHCs have higher rates of Pap smear screening than patients of male providers, and that these results vary by patient insurance status

These findings suggest that additional inquiry into provider gender-related behaviors (such as differences in patient communication and visit time, and how these behaviors are mediated by patient insurance status in this population) is warranted. In addition, future study should explore the role of patient preference for providers of different genders in terms of receipt of Pap smear screening and other female-sensitive services in this unique population in order to help further explain the findings presented here. We also recommend the inclusion of other provider characteristics, such as provider specialty and provider language, as they may provide further insight on differences in care delivery among the CHCs studied. Results from such a comprehensive study would provide important information for long and short-term targeted interventions that could lead to reduced cervical cancer among at-risk women in Florida.

Table 4.1: Characteristics of patients and Pap smear compliance rates across seven Community Health Centers in Florida: January 1, 2007 to December 31, 2007 (n=22,997)

	No. of cases	% ^a	No. with Pap	% ^b
Patient Characteristics				
<i>Age</i>				
21-45	13,716	59.6	7,769	56.6
46-64	9,281	40.4	3,882	41.8
<i>Race</i>				
White, non-Hispanic	4,216	18.3	1,316	31.2
Black, non-Hispanic	5,356	23.3	2,423	45.2
Hispanic	13,425	58.4	7,912	58.9
<i>Insurance</i>				
Uninsured	16,603	72.2	8,337	50.2
Insured	6,394	27.8	3,314	51.8
Provider Gender				
Male	11,444	49.8	5,299	46.3
Female	11,553	50.2	6,352	55.0

^a Column Percent

^b Percent with Pap smear

Table 4.2: Pap smear compliance rate of patients by provider gender across seven Community Health Centers in Florida: January 1, 2007 to December 31, 2007 (n=22,997)

			Male Providers		Female Providers		P value
			No. Of cases	% with Pap	No. Of cases	% with Pap	
Hispanic	<i>Insured</i>	21-45	889	63.2	1,136	76.9	<0.001
		46-64	431	38.5	394	53.8	<0.001
	<i>Uninsured</i>	21-45	3,439	59.0	2,941	66.7	<0.001
		46-64	2,375	44.2	1,820	58.1	<0.001
Black, non-Hispanic	<i>Insured</i>	21-45	470	53.0	735	59.7	0.012
		46-64	325	34.2	435	44.1	0.003
	<i>Uninsured</i>	21-45	559	47.0	1,227	48.2	0.35
		46-64	605	31.4	1,000	38.8	0.002
White, non-Hispanic	<i>Insured</i>	21-45	582	28.0	339	48.1	<0.001
		46-64	410	23.9	248	34.3	0.003
	<i>Uninsured</i>	21-45	693	33.3	706	34.4	0.36
		46-64	666	27.9	572	25.7	0.21

^a Pearson chi-square

Table 4.3: Estimated Odds of Receiving a Pap smear: Women Treated at 7 Community Health Centers in Florida: January 1, 2007 to December 31, 2007 (n=22,997)

	OR	95% CI
<i>Effect of provider gender by patient age (years) & patient insurance status</i>		
Female vs. male provider among insured, 21-45 women	1.77	1.57 , 2.00
Female vs. male provider among insured, 46-64 women	2.17	1.89 , 2.49
Female vs. male provider among uninsured, 21-45 women	1.00	0.91 , 1.09
Female vs. male provider among uninsured, 46-64 women	1.22	1.10 , 1.35
<i>Effect of patient insurance status by patient age (years) & provider gender</i>		
Insured vs. Uninsured among women ages 21-45 seen by female provider	1.88	1.69 , 2.08
Insured vs. Uninsured among women ages 45-64 seen by female provider	1.55	1.37 , 1.76
Insured vs. Uninsured among women ages 21-45 seen by male provider	1.05	0.95 , 1.17
Insured vs. Uninsured among women ages 45-64 seen by male provider	0.87	0.77 , 0.98
<i>Effect of patient race by patient age</i>		
Hispanic vs. White, non Hispanic among women ages 21-45	2.33	2.10 , 2.59
Black, non Hispanic vs. White, non Hispanic among women ages 21-45	1.56	1.38 , 1.76
Hispanic vs. White, non Hispanic among women ages 46-64	1.64	1.44 , 1.86
Black, non Hispanic vs. White, non Hispanic among women ages 46-64	1.16	1.00 , 1.33
<i>Effect of patient age by patient race & insurance & provider gender</i>		
21-45 vs. 46-64 among Hispanic, insured women seen by male provider	2.27	1.97 , 2.62
21-45 vs. 46-64 among Hispanic, uninsured women seen by male provider	1.88	1.71 , 2.07
21-45 vs. 46-64 among Black, non-Hispanic, insured women seen by male provider	2.15	1.82 , 2.53
21-45 vs. 46-64 among Black, non-Hispanic, uninsured women seen by male provider	1.78	1.53 , 2.05
21-45 vs. 46-64 among white, non-Hispanic, insured women seen by male provider	1.60	1.34 , 1.90
21-45 vs. 46-64 among white, non-Hispanic, uninsured women seen by male provider	1.32	1.13 , 1.54
21-45 vs. 46-64 among Hispanic, insured women seen by female provider	1.86	1.60 , 2.15
21-45 vs. 46-64 among Hispanic, uninsured women seen by female provider	1.53	1.38 , 1.70
21-45 vs. 46-64 among Black, non-Hispanic, insured women seen by female provider	1.75	1.51 , 2.04
21-45 vs. 46-64 among Black, non-Hispanic, uninsured women seen by female provider	1.45	1.27 , 1.66
21-45 vs. 46-64 among white, non-Hispanic, insured women seen by female provider	1.30	1.09 , 1.55
21-45 vs. 46-64 among white, non-Hispanic, uninsured women seen by female provider	1.08	0.91 , 1.26

^a OR=odds ratio; CI=confidence interval. OR estimates are based on the logistic regression model which includes patient insurance, patient age, patient race/ethnicity, provider gender, patient insurance x provider gender, patient age x provider gender, patient age x patient insurance, patient age x patient race and center. ORs are considered significant if the 95% CI does not include 1.0.

CHAPTER 5 - ORGANIZATIONAL STRATEGIES ASSOCIATED WITH PAP SMEAR SCREENING COMPLIANCE ACROSS NINE FLORIDA COMMUNITY HEALTH CENTERS

Summary

Community Health Centers are our Nation's primary care safety net, providing care to patients who are largely uninsured and racially/ethnically diverse. Women from such populations are most at-risk of developing cervical cancer, primary as a result of underutilization of Pap smears.

Routine Pap smear screening can prevent the onset and progression of cervical malignancies. This paper reports on findings of an exploratory study which examined if the implementation of Electronic Health Records, adoption of the Health Disparity Collaborative, and internal quality or process improvement initiatives specifically focused on improving receipt of Pap smears screening were associated with improved Pap smear screening rates across nine CHCs in Florida. Findings suggest that a synergistic approach to quality improvement that incorporates sophisticated health information technology, in conjunction with implementation of evidence-based models for quality improvement, may be related to improved Pap smear screening compliance.

Background

It is estimated that 11,070 women in the United States will be diagnosed with cervical cancer in 2008, and approximately 3,870 will die from the disease.⁷ The Papanicolaou (Pap) smear is extremely effective in identifying pre-cancerous lesions and early-stage cervical cancer when the prognosis for survival is good. Despite the reduced risk for disease mortality among women who receive regular Pap smears, national data suggest that only 80% of US women are screened once every three years as

recommended by national guidelines. Screening rates are even lower among Hispanic women, as well as women who are poor, and uninsured or underinsured.⁵⁸

Community Health Centers (CHCs) were established during the 1960s “War on Poverty” to provide comprehensive primary health care services to the poor and uninsured.³⁰ CHCs primarily operate in poor rural and urban neighborhoods where residents face a myriad of socio-economic, behavioral and cultural access to care barriers. Such barriers disproportionately predispose individuals residing in these neighborhoods to an increased risk of adverse disease outcomes, including cervical cancer incidence and mortality.¹⁰

Eliminating cervical cancer disparities requires high-quality, effective and efficient service delivery across the entire cancer continuum, from preventive screening to appropriate and timely treatment for persons diagnosed with disease.⁷² CHCs have demonstrated a commitment to operating health care organizations that adhere to quality standards and principals of care. Many CHCs are accredited by the Joint Commission on Accreditation of Health Care Organizations and other recognized accreditation bodies, and, as such, have adopted process improvement techniques throughout their organizations. Over the past decade, this focus on quality care has been further aided by Federal initiatives, such as grant support for the implementation of sophisticated health information technology and also for the development of the Health Disparity Collaboratives (a primary care evidence-based quality improvement initiative).

The purpose of this exploratory study was to use an ecologic approach to examine if adoption of organizational quality initiatives is associated with improved Pap smear screening rates across nine CHCs in Florida. It was proposed that results from this

analysis may lend support for more comprehensive study of multi-level determinants of Pap smear screening that, in turn, can drive the development and implementation of meaningful strategies to reduce cervical cancer disparities among patients served by CHCs.

Receipt of Pap smear is a complex marker of health disparity influenced by determinants operating across multiple levels of effect. There is a substantial body of research documenting associations between various patient risk factors, including socio-economic characteristics, demographic variables, behaviors and cultural beliefs, and Pap smear compliance.^{3,4,8,10,11,13-15,19,20,23,26,55,63} Provider characteristics have also been found to play an important role in patient receipt of preventive cancer screening, such as Pap smears.^{16,22,26,27,51,57,73} Additionally, a few recent studies also uphold the importance of organizational variables, such as adoption of health information technology, care process redesign and quality and process improvement initiatives, in the delivery of primary care services, including Pap smears. However, the relationship between organizational-level variables and Pap smear compliance is not well understood, and merits additional inquiry.^{28,39,74,75}

The specific organizational variables that were selected to evaluate in relation to Pap smear compliance include 1) adoption of electronic health records, 2) implementation of the Health Disparity Collaboratives, and 3) center-led quality improvement or process improvement projects specifically focused on Pap smear compliance. These three organizational variables were selected based on their scope and their potential impact on improving Pap smear screening rates.

Electronic Health Records (EHR) is a sophisticated health information technology that combines patient visit and ancillary service data in an integrated patient record. The role of EHR on improving care delivery and health outcomes is logical. Most EHR systems include the ability to print patient disease registries, trend disease outcomes, monitor patient compliance with recommended care and prompt providers at patient point-of-care. These combined functionalities support increased provider knowledge at point-of-care, improved monitoring of patient compliance and better adherence to quality care guidelines. While there are no rigorous studies comparing EHR system implementation with improved health outcomes in primary care, research suggests that EHR implementation may be associated with improved delivery of care across a number of preventative health measures, including Pap smear screening.^{35,76-82,82-84}

The Health Disparity Collaboratives (HDC) is a national organizational quality improvement initiative developed to create an integrated health care environment that is well poised for meaningful improvement in both care delivery and disease outcomes. The HDCs provide tools and resources to assist health care organizations to transform care delivery by integration of evidence-based care models into the organizational framework. The HDCs were developed in 1998 by HRSA, in cooperation with the National Association of Community Health Centers and Centers for Disease Control. The HDC approach integrates the Learning Model, developed by the Institute for Healthcare Improvement (IHI), the Chronic Care Model developed by Edward Wagner and the Improvement Model developed by Associates in Process Improvement, Inc. (API).⁴⁴ These three models provide an evidence-based framework for organizational preparedness and readiness for change, for implementation and execution of an improved

care delivery system and for ongoing evaluation, monitoring and improvement of the care model. Currently, there are HDCs for Diabetes, Cardiovascular disease, Prevention, Cancer, Asthma, Depression and Business system redesign. CHCs can participate in one or more collaborative based upon readiness and resources. Published results from early HDC implementations suggest that this initiative can improve delivery of care and health outcomes in CHCs.⁸⁵⁻⁸⁸

The nine CHCs included in this study are all members of a large, integrated delivery system network, Health Choice Network (HCN). HCN was founded in 1994 by a partnership of five South Florida CHCs. These early members were interested in a formal collaboration that could result in improved delivery of care through integration of financial and business systems, information technology and clinical programs that would otherwise be difficult to support in a single organization. Today, HCN is governed by 54 member CHCs who comprise a minority-based Board of Directors. Network members maintain their vital community orientation by retaining their local-governing, consumer-majority Boards of Directors. Overall, HCN's member CHCs serve over 1 million patients across CHCs in Florida, New Mexico, Utah, Iowa, Kansas, Nebraska, Hawaii and New York.

CHCs within HCN have been proactive in implementing tools and resources to improve care delivery and health outcomes including EHR, the HDCs and center-led quality improvement initiatives. Through a generous Information and Communication Technology (ICT) grant awarded by the Federal Human Resource and Services Administration (HRSA), HCN has thus far implemented functionalities of EHR across 60% of member CHCs. The full suite of EHR functionalities include laboratory interface,

prescription writer, a clinical task writer module for care team coordination, document imaging and electronic chart documentation. It is expected that all 54 CHCs in HCN will operate on the full suite of EHR modules by 2010.

Implementing and adopting EHR and HDCs requires tremendous resources, and the application of change management principals throughout the organization. Therefore, it is important to study the potential impact of these initiatives on care delivery and health outcomes in order to support informed health care decision-making. Though limited by nine centers, this exploratory study sought to provide insight on the relationship between Pap smear screening compliance and 1) implementation of Electronic Health Records, a sophisticated health information technology, 2) adoption of the Health Disparity Collaborative, an evidence-based organizational quality improvement framework, and 3) internal quality or process improvement initiatives specifically focused on improving receipt of Pap smears among patients. Findings from this analysis provides preliminary data on the potential role of the aforementioned initiatives on cervical cancer disparities, as well as provides a methodology that can be applied to larger, more rigorous studies of health disparities and health outcomes within CHCs.

Conceptual Framework

This study is guided by a conceptual framework developed by Zapka et al (2003), known as the Quality in the Continuum of Cancer Care (QCCC) framework, that approaches the cancer continuum, from screening to treatment, from an ecologic, or multi-level perspective.³⁹ The QCCC framework was designed to support research in quality improvement of cancer care across the health care service spectrum from preventative screening to treatment of disease.. As an ecologic framework, the QCCC

incorporates components of the Behavioral Model of Utilization developed by Anderson et al.⁴⁰, the Precede Proceed Model developed by Green et al.⁴¹ and the Care Model developed by Wagner.^{42,43} The integration of these models into one, unifying framework suggests that meaningful improvements in cancer care are driven by a complex number of factors operating across multiple levels of influence, including the community level, the plan level and the practice setting level. The QCCC framework proposes that interaction among multiple factors within each level of influence impacts care processes, thereby affecting the efficiency, equity and effectiveness of patient care delivery.

The ecologic orientation of the QCCC framework provides additional rationale for considering multi-level factors, such as organizational determinants, that may contribute to differences in the delivery of quality care, including receipt of preventative cervical cancer screening. By understanding the important role of organizational factors on Pap smear screening in CHCs, CHC proponents can effectively direct the prioritization and allocation of scarce public health dollars towards those activities that are most impactful.

Based on the results from previous studies and the theoretical evidence offered by the QCCC, the current study examined the association of organizational factors pertinent to CHCs on Pap smear screening rates. The purpose of this additional study was to further understand and explain Pap smear screening disparity in terms of organizational variables, and to support impactful and meaningful strategies for the improvement of Pap smear screening within CHCs.

Methods

This exploratory study used data from nine CHCs in Florida to examine the role of organizational factors on compliance with Pap smear screening among eligible women seen for primary care during 2007. The study methodology incorporated the calculation of Pap smear compliance rates by CHC and the comparison of these rates to results from a short organizational survey administered to Medical Directors of the nine CHCs.

Pap smear compliance for the individual CHCs was calculated by identifying all women ages 21-64 years old seen at least one time for a primary care visit in one of the nine CHCs during 2007 from the patient database maintained at HCN. Socio-demographic data including age, race/ethnicity and insurance of eligible patients was extracted from the EHR system and included in the patient data file in order to describe the populations within the CHCs.

This data file was then further refined to include claims data and EHR data from 2005 to 2007 indicating the percent of women who had a documented Pap smear screen within the past 3 years. The criteria used to calculate Pap smear screening compliance were adopted from the Bureau of Primary Health Care Quality of Care performance measure specifications outlined in the 2008 reporting manual for CHCs.⁵ In order to compute the Pap smear compliance rate, a minimum of four years of complete claims data covering the period January 1, 2004 to December 31, 2007 were needed. Ten CHCs in HCN satisfied this requirement.

The initial dataset included 63,954 women. One center was dropped from the final research file due to non-return of the organizational survey, leaving a total of 9 CHCs. This resulted in a final dataset of 61,342 patients. The proportion of patients from the 9

CHCs included in the study are as follows: 56% of the patients are from six CHCs in Southeast Florida, 29% of the patients are from one CHC in southwest Florida and the remainder of the patients is from two CHCs in the greater Tampa area.

The inclusion of organizational factors was based on the results of a short, six-question organizational survey administered to Medical Directors of the respective CHCs. There were 10 surveys administered either in person or via a secured email network, and nine surveys were returned. The survey tool was designed by the study investigators. The research team recognized that this exploratory study might evolve into a more rigorous investigation requiring an expanded questionnaire; therefore the tool was designed to be brief and to capture only select data elements needed for this inquiry.

The organizational determinants were selected based on the most significant initiatives undertaken in the past five years by HCN and member CHCs to improve Pap smear screening rates. These included implementation of EHR, participation in one or more HDCs, and, having selected Pap smear compliance as a focus area for CHC-led quality or process improvement project. The organizational variables were dichotomized as follows: level of HER integration (>90% of providers using full EHR capabilities vs. <90% of providers), implementation of Health Disparity Collaboratives in any disease or business area, and pap smear screening as a focus area for a Medical Director-led quality or process improvement initiative at the CHC.

SPSS version 15 was used to calculate Pap smear screening compliance rates and to describe the patient population in the CHCs. Microsoft Excel was used to analyze the survey data and to produce tables and charts.

Pap smear screening compliance by CHC was ordered by rate (lowest to highest), and reviewed in conjunction with population characteristics in terms of insurance, race/ethnicity and age, as well as the results of the organizational survey. Summary charts and tables were used to facilitate interpretation of the data.

Results

Figure 1 shows the crude Pap smear screening rates in each of the nine CHCs, presented from worst to best. The overall Pap smear screening rate across the nine CHCs was 54%, with a range from 33% to 84%. Table 5.1 shows the distribution of the female population eligible for Pap smear screening in each of the CHCs by age, race/ethnicity and insurance. As seen in Table 5.1, the majority of CHCs serve a racially/ethnically diverse and largely uninsured patient population. The patient race/ethnicity distribution between the 9 CHCs varied in terms of the percent of women who are white non-Hispanic, black non-Hispanic, and Hispanic. Seven of the nine centers had greater than 75% of the population from black non-Hispanic and Hispanic racial/ethnic groups. One center (Center 9) had a 90% Hispanic population. The insurance status of patients seen in these CHCs was largely uninsured (range 55% to 95% uninsured). The mean age of women across the CHCs was 41 years old, with a range from 40 to 44 years old.

Responses to the organizational survey of Medical Directors are summarized in Table 5.2. Results revealed that slightly less than half (44%) of the CHCs involved in the study reported having diffused the full suite of EHR with at least 90% of primary care providers including Medical Doctors, Doctors of Osteopathic Medicine, Physician Assistants and Nurse Practitioners. The full suite of EHR includes the prescription writer, lab interface, and clinical charting. Regarding participation in HDCs, seven of

nine Medical Directors (78%) reported that their CHCs had participated in at least one HDCs collaborative in one of the following areas: Diabetes, Cardiovascular disease, Cancer, Depression, Primary Care, or other area. Of the seven CHCs that participated in the HDCs, six specified the Diabetes collaborative, and no center indicated participation in the cancer or preventative care collaborative. In response to the question regarding Pap smear having been a focus area for quality or process improvement initiatives within the CHC, seven of nine Medical Directors (78%) responded favorably. Among those who had implemented a Pap smear quality or process improvement project, five Medical Directors indicated that the reported project involved care process redesign specifically directed towards improving compliance rates.

In Table 5.3, the number of organizational characteristics (diffusion of EHR, participation in HDCs, and Pap smear as a quality or process improvement project) are summed and compared to each CHC's Pap smear compliance rate, presented from worst compliance rate to best. Of the nine CHCs included in the study, two CHCs reported only implementing one of the organizational characteristic of study, five had implemented two organizational characteristics of study, and two CHCs had implemented all three of the organizational characteristics of study.

An interesting finding of this exploratory analysis was that the two best performing CHCs in terms of Pap smear compliance rates were also the only two CHCs to have responded favorably to having implemented all three organizational strategies of interest. While the worst performing CHCs only reported one organizational characteristic, this did not seem to indicate a trend as Center 5, the fifth worst performing center, also reported adoption to only one organizational characteristic. Other

associations between Pap smear compliance rates and organizational characteristics could not be identified from the data.

Discussion

The purpose of this study was to use an ecologic approach to explore possible associations of organizational initiatives implemented at CHCs to Pap smear compliance. This study supplemented findings from previous research on the same set of data which investigated patient and provider variables associated with Pap smear screening rates. The key organizational strategies considered in the analyses were those cited by academic literature, HRSA, and CHC stakeholders as potentially having the greatest impact on the delivery of care to patients served by CHCs. They included adoption and diffusion of an EHR system, implementation of one or more HDCs and center-led Pap smear quality or process improvement initiative. Among the nine CHCs included in our analyses, there were only two centers that implemented full functionality of a sophisticated EHR system, and also instituted care process redesign efforts through the HDC initiative. Additionally, both of these CHCs also had Pap smear compliance as a focus of quality improvement efforts within the past five years. Perhaps not surprisingly, these centers were also the top two performers in terms of Pap smear compliance rates. This finding may imply that a synergistic approach to quality improvement that incorporates sophisticated health information technology, in conjunction with implementation of evidence-based models for quality improvement, may be related to improved Pap smear screening compliance among CHCs in Florida.

Previous research within the same population of CHC patients has demonstrated a statistically significant relationship of patient and provider variables with rates of Pap

smear compliance. This analysis, modeled on the QCCC framework, suggested that organizational level initiatives designed to improve the delivery of quality care to patients may also play an important role in cervical cancer screening compliance, and should be considered when conducting health disparity and quality improvement research.

There are several limitations to this study. First, there were only nine CHCs included in the study. As such, results of this descriptive study could not be tested for statistical significance due to the very small sample size. However, a relationship between organizational strategies designed to improve care delivery and Pap smear screening compliance at CHCs was postulated. As diffusion of EHR continues through the HCN network, this study can serve as a basis for future research that includes additional CHCs. It is recommended that future studies include an appropriate sample size to support more rigorous statistical testing .

This analysis was also limited by the number of organizational variables tested. As an exploratory study, we were mindful of restricting the amount of time needed for Medical Directors to complete the organizational survey. A more comprehensive analysis of the impact of organizational variables on delivery of care is recommended. Such organizational variables that may be associated with delivery of high-quality primary care services and should be included in future research include management structure, scope of services provided and organizational culture, among others.

Finally, this analysis was limited to nine CHCs located in Florida, six of which are situated in South Florida. South Florida is a diverse landscape comprised largely of racial/ethnic groups from Latin America and the Caribbean. As such, there may be particular characteristics of the health care environment in South Florida under which

these CHCs operate that may uniquely affect the delivery of primary care, including cancer prevention screening. Future studies should include CHCs across multiple geographic areas so commonalities due to region can be controlled for in the analysis.

Also, it should be noted that conducting research in HCN requires utmost sensitivity in terms of how results are disseminated. This study is part of a first effort to use HCN data for research purposes. HCN is governed by a 54 member Board comprised of independently owned and operated CHCs. The EHR system, maintained at HCN, stores health data on over one million patients, most of who are from low-income, racial/ethnic groups. HCN and member centers recognize the enormous potential of using their data to understand health disparities and identify opportunities for improvement. In fact, using these data for research is part of the overall HCN strategic plan. However, this direction must be balanced by HCN's critical need to protect CHC and patient vulnerability by determining how, and by whom, this information should be accessed, summarized and disseminated. The research team recognizes that further academic collaboration can be compromised by releasing data that may perceive to stigmatize individual or groups of CHCs. Therefore, information that may add value to this analysis, such as CHC as name, operating budget, location, and provider make-up cannot be revealed.

Despite these important limitations and concerns, our findings suggest that the adoption of multiple organizational strategies designed to improve delivery of care were associated with improved Pap smear compliance rates in 9 CHCs. The methodological approach applied to this study using the QCCC framework lays the foundation for future,

larger-scale pragmatic studies in the CHC environment exploring the relationship between multi-level determinants of care and health disparities.

In the public health environment, resource-heavy initiatives such as health information technology investments are often not sufficiently evaluated. Larger studies, which can provide greater insight into the role of organizational strategies on improving delivery of quality care and, more importantly, health outcomes are needed to help support informed public health decision making. By better understanding the multiple factors that may contribute to health disparities, clinical and business decision-makers can more effectively target scarce resources towards designing and implementing initiatives that can have the most impact on CHC patients.

Figure 5.1: Pap Smear Screening Compliance Rates Across Nine Community Health Centers (from best to worst screening rate, n=9)

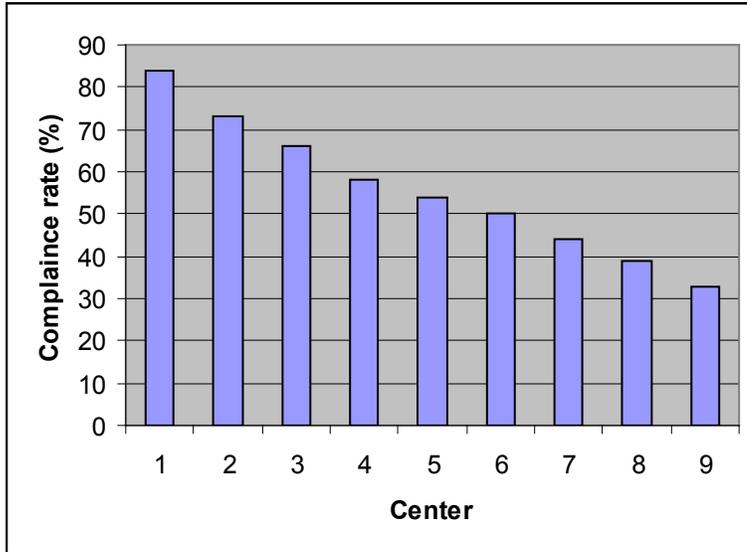


Table 5.1: Characteristics of Patients by Center, presented best to worst Pap smear screening compliance rate (Based on 2007 data, N=61,342)

Age Patient	Patients by Race			Patients by Insurance		
	size Mean (SD)	White, NH	Black, NH	Hispanic	Insured	Uninsured
Center 1	<5,000 43 (12.3)	3%	7%	90%	12%	88%
Center 2	>5,000 40 (12.9)	8%	29%	62%	24%	76%
Center 3	>5,000 40 (12.2)	9%	13%	78%	25%	75%
Center 4	<5,000 44 (11.0)	13%	37%	50%	5%	95%
Center 5	>5,000 41 (13.1)	3%	60%	37%	29%	71%
Center 6	<5,000 43 (12.3)	21%	32%	47%	33%	67%
Center 7	>5,000 40 (12.2)	35%	16%	49%	35%	65%
Center 8	>5,000 40 (12.9)	51%	35%	14%	45%	55%
Center 9	>5,000 40 (12.1)	24%	46%	31%	29%	71%
Aggregate	20% (12.5)	30%	50%	29%	71%	41

Table 5.2: Organizational Characteristics of Centers, presented best to worst Pap smear screening compliance rate

	>90% Providers using EHR Total	Implemented one or more HDCs	Pap smear QI Focus
Center 1	Yes	Yes	Yes
Center 2	Yes	Yes	Yes
Center 3	No	Yes	Yes
Center 4	Yes	No	Yes
Center 5	No	Yes	Yes
Center 6	Yes	No	No
Center 7	No	Yes	Yes
Center 8	No	Yes	Yes
Center 9	No	Yes	No

Table 5.3: Nine Community Health Centers by Pap smear screening compliance rate (best to worst) compared to number of organizational characteristics

	% Pap compliance	Pap smear compliance (Best to worst)	# Org. Characteristics[*]
Center 1	84.4%	9	3
Center 2	73.2%	8	3
Center 3	66.5%	7	2
Center 4	58.3%	6	2
Center 5	53.7%	5	2
Center 6	50.3%	4	1
Center 7	44.3%	3	2
Center 8	39.4%	2	2
Center 9	32.6%	1	1

*Total number of “Yes” response to organizational characteristic from Table 2.

CHAPTER 6 - CONCLUSION

Summary

This research was conducted using patients seen at Community Health Centers, the primary care safety net for low-income and uninsured individuals. While our findings were largely limited to the CHCs included in this study, results add to current knowledge of determinants of Pap smear screening among at-risk women and important areas for future inquiry.

In terms of Pap smear compliance, overall rates in this population were 53%, much lower than the HealthyPeople 2010 90% target. Findings from this study prompted several initiatives by Medical Leadership of the CHCs that are being put in place in order to improve screening such as new EHR forms, clinical care guidelines and provider training on the Pap smear screening quality measure.

We hypothesized that Hispanic women would have different Pap smear screening utilization rates than white, non-Hispanic and black women. While we did not stipulate a direction for our results, the expectation based on national data was that rates among Hispanic women would be lower than those among other race/ethnic groups.^{3,4,58} Our finding that Hispanic women were more likely to be screened was surprising. Upon further inquiry, we believe that this finding reflects the unique composition of women in our study, the majority of whom are Hispanic and from Miami-Dade County Florida. While we could not ascertain Hispanic sub-group from our database, the majority (>60%) of Hispanics in Miami-Dade are from Cuba. Analyses have demonstrated that women from Cuba, verses Hispanic women from Mexico, Puerto Rico and South and Central

America, have rates of cervical cancer similar to white women.⁸⁹ This may indicate that Cuban women are more likely to receive screening than other Hispanic groups.

Another plausible explanation for the comparatively higher rates of screening among Hispanic women in this study is the unique mix of providers serving in CHCs in general, and across the ten CHCs in this study in particular. CHCs are dedicated to hiring and retaining culturally competent staff that reflects the communities they serve.⁵⁹ While we did not know the race/ethnicity of providers in the 10 CHCs, we were able to ascertain that 88% of the providers included in the study were bi-lingual Spanish speakers. Based on the important role language plays among Hispanics seeking primary care.^{90,91}, it is plausible our findings can be partially explained by the skills of the providers serving the CHCs in this study.

While we were not able to test all provider variables per the proposal, we did investigate the role of provider gender on patient receipt of Pap smear. Our results suggest that provider gender is an important variable to consider in the study of Pap smear screening disparities. Insured women who saw female providers were significantly more likely to have been screened compared to women who saw male providers. This finding was consistent among both younger (OR=1.8) and older (OR=2.2) women. This finding supports results from previous studies investigating the role of provider gender on patient receipt of preventative services.⁴⁹, mammograms.⁹² and Pap smears.⁵⁰⁻⁵²

Among uninsured women, however, the role of provider gender on Pap smear utilization was much less important. Older uninsured women who saw female providers were only slightly more likely to be screened compared to those who saw male providers. There was no difference due to provider gender among younger uninsured women.

While we cannot fully explain our findings, it is speculated that these results may represent the successful impact of Federal, state and local programs that specifically target the uninsured for Pap smear screening, such as the National Breast and Cervical Cancer Prevention Project.²⁴ and Project Screen.⁷¹ We did not study the marketing of these programs to providers or their prioritization in CHC operations, but the possibility that training and prioritization of such programs in the context of meeting HealthyPeople 2010 objectives may serve to eliminate gender related differences that might otherwise exist.

Our results suggest the need to further explore the gender-related factors that might contribute to our findings in order to more thoroughly understand determinants of Pap smear screening among women screened at CHCs in Florida. While we were not able to investigate the role of other provider variables as we had initially intended, such as provider language, provider medical degree and provider specialty, results of this analysis on provider gender does present important information that should be further explored in order to improve screening among this population.

In conducting the provider gender study, we merged patient data with provider variables from a provider credentialing database. To our knowledge, this is the first time such a data linkage was created in order to conduct study on provider variables in primary care. This is important because such provider variables are often captured via surveys, which can be compromised by low response rates. This data merger of provider variables from a credentialing database presents a new opportunity that can be explored in future studies that seek to incorporate provider characteristics in the study of health disparities. For example, credentialing systems often capture provider language,

specialty, age, board certifications and training (e.g. residency, fellowship). This information provides an opportunity to use electronic data to explore numerous provider characteristics on primary care service delivery in a way that is quicker and less expensive than traditional survey methods.

In terms of organizational variables, we found that diffusion of EHR, implementation of Care Model principals in the CHC and having had Pap smears as a quality or process improvement project within the last five years may be potential drivers of higher Pap smear compliance. Moreover, our results suggested that it is an integrated approach of all three of these initiatives that are associated with higher screening utilization. While the number of CHCs included in this study were too small for testing the significance of our findings, the preliminary data presented are important for CHCs, many of whom are currently engaging in electronic health record system implementations in order to improve quality care.^{35,81} Our results supplement limited knowledge currently available which proposes that EHR implementation alone does not drive improved quality of care.⁸² Rather, adoption of EHR systems must act in concert with other organizational initiatives such as redesigning of care teams in order to maximize the investment and realize improvements.^{77,84} As EHR diffusion continues, it will be important to continue to evaluate the implementation of EHR on improved care delivery, including Pap smear utilization, in order to understand the relationship of new technologies on health disparities.

Overall, this research provided some important insights regarding Pap smear screening among a population that is at high-risk of cervical cancer mortality and morbidity. Throughout the process of conducting this research, we identified several

strategies that could (and have) been employed in order to improve screening of women seen and to more accurately report Pap smear screening utilization among patients seen by HCN CHCs. Such strategies included new ways for providers to use HER in order to capture clinical information for reporting purposes. In addition, we broadened our knowledge regarding important associations of Pap smear screening in a large underserved population, particularly in terms of the significance of patient race/ethnicity, provider gender and the potential of EHR systems. We also identified several opportunities that should be explored in order to more thoroughly understand factors contributing to Pap smear utilization across CHCs in Florida. Most notably, we will continue to seek funding to study the interplay of a broad spectrum of socio-demographic patient risk factors, provider characteristics and practice behaviors, and organizational characteristics, such as EMR diffusion, on delivery of Pap smear screening and other primary care services.

The primary goal of conducting research on CHCs populations, which include patients most at-risk for health disparities, is to identify short and long-term interventions that can be implemented to improve delivery of primary care services. This study is of importance to the CHCs included in this study, as well as other members of HCN, in that it provides information about determinants of Pap smear screening health disparities. As a result of this study, the CHC clinical leadership is reviewing Pap smear screening rates more regularly and within different population sub-groups. In addition, the Medical Directors have increased training on appropriate screening guidelines. Findings of this study have been disseminated throughout CHCs nationally in order to raise awareness of the possible roles of patient characteristics, provider gender and organizational variables

on screening utilization. We hope that this research, which represents the first study for HCN using its large HER system, will drive the design and development of proven interventions that will meaningfully improve screening and reduce health disparities among patients served by CHCs.

Limitations

There are numerous limitations to this study that are discussed within each paper. An important limitation to highlight is the limited geographic distribution of patients included in this study. The majority of centers and patients are from Southeast Florida. In Miami-Dade County, Hispanics are the majority ethnic group, accounting for 61% of residents. Furthermore, due to immigration from neighboring Cuba, the Hispanic make-up in Southeast Florida is unique. It has been suggested that Hispanics from Cuba have health status on-par with whites in the US, partly due to the widespread availability of primary health care in Cuba. In addition, the high number of Spanish speaking providers in this study may suggest that the provider make-up in Southeast Florida is aligned culturally to the communities served, more so than what might be found in other areas of the country. This could have implications in terms of care delivered to Hispanics in these communities when compared to other areas of the country, and may help to explain why Hispanics in this study have higher Pap smear compliance rates than white, non-Hispanic and black patients, even after adjusting for other patient and provider confounders.

Another important limitation is the small number of CHCs included in the study. This had major implications on the ability to draw conclusions on organizational factors associated with Pap smear compliance. While results of the organizational study suggested that EHR and other strategic quality initiatives do appear to influence Pap

smear screening compliance, statistical tests could not be applied to the data.

Conducting the organizational analysis across a larger number of CHC would have allowed us to draw more definite conclusions on the association between HER and improved Pap smear utilization. This knowledge could help to demonstrate the role of health information technology on quality improvement, thus lending support for increasing acceptance and diffusion among health care professionals.

Conducting this study within CHCs also presented challenges and limitations. The CHCs in this study are relatively new users of a sophisticated EHR system. The EHR system at HCN was adopted with a vision to reduce risk due to medical records documentation and management, reduce costs related to medical records redundancy, and improve the delivery of quality care through built-in guidelines at the point-of-care and other technology innovations at the point of care (e.g. electronic ordering, electronic lab review.) However, the goal of implementations was to bring providers “live” on the system. Integration of EHR into reporting for clinical operations and quality improvement was not built into early implementations and, as such, data validity was not a priority. As a result, the EHR data used in this study required multiple extractions and multiple aggregations of fields, in order to produce a “clean” and workable research file. Though errors were minimized, it is likely that there is still a margin of error with regard to data validity of Pap smear compliance and patient and provider characteristics. While some of these errors may have resulted in slight underestimation of Pap smear compliance rates, it is unlikely that findings would have changed in a meaningful way.

Conducting this study was the first time HCN engaged in research using patient data. There were many challenges the project investigator faced in terms of personal

beliefs and knowledge gaps by executive leadership. While the HCN CEO and the HCN Clinical Committee astutely added “publishable outcomes” to the Clinical Workplan developed in early 2007, the details in meeting this deadline were not discussed until very recently. Sparked by the request to publish the first paper completed as part of this research, Executive Leadership at HCN recognized a need to develop policies and procedures related to publication of results. One of the dissertation committee members was the responsible party to develop the policy, and the PI of this study was a key member of the policy development workgroup. This dynamic created some tension within the larger workgroup in terms of driving realistic timelines for review and dissemination. To date, the policy is not yet finalized, though members of the HCN Research Committee and the HCN Clinical Committee have committed to publishing such results as presented in these papers and engaging in similar research with a goal towards publication.

Future Direction

Applying epidemiologic principle to the study of health disparities in these CHCs provided critical information for future HCN research endeavors. First, conducting this study using EHR highlighted the need to invest resources to improve data validity so that future quantitative studies will have improved rigor. Second, this study highlighted the possibilities of how HCN’s extensive EHR system can be used to support epidemiologic research in the areas of disease surveillance, quality improvement and health disparities. Third, this study helped to build capacity for HCN and partners to conduct meaningful research which, if applied appropriately, can help to improve the care delivery and health of patients served by member CHCs.

In order for HCN to conduct meaningful research using EHR, data validity must be improved. Until recently, the approach to implementing EHR in these centers has been on productivity, not necessarily on care delivery evaluation and disease surveillance. As a result of this research and similar initiatives currently in place at HCN, Executive Leadership has supported a strategy to streamline data capture and improve data validity in order to position HCN to conduct quality improvement evaluation and health disparities research. Moreover, this research provided important background material for a recent Health Information Technology grant awarded to HCN by HRSA. This \$500,000 one year grant will support development of a provider clinical information tool called QUICK (Quality and Utilization Informatics for Clinician Knowledge). A major part of the grant funding will be allocated to assessing the data validity and data reliability readiness of each CHC to maximize use of the QUICK tool.

From a public health perspective, this study presents a new way to use innovations in health information technology to conduct public health research. To our knowledge, this is the first study which uses an integrated EHR system to conduct health disparities research in a large, underserved population of women, including a large cohort of uninsured women. While there were significant limitations with this study which have been described in detail above, it is strongly believed that, as EHR becomes more widespread, integrated databases will be increasingly used to conduct retrospective and cross-sectional research. This is particularly relevant for uninsured populations who are often excluded from research, despite them being the most likely to bear the burden of health disparities.

Finally, the ecologic approach used in this study can add important value to health disparity and quality improvement research. Targeted patient interventions, while critical, are costly, and there are few demonstrated outcomes. Scarce public health dollars require that we implement solutions that can have sustainable change. In the case of health disparities, conducting research that incorporates patient, community and organizational variables provides an expanded opportunity to identify interventions that can be designed and implemented to create sustainable improvements in care delivery to populations at-risk of adverse disease outcomes.

Recommendations

Recommendations to improve future studies of Pap smear screening risk factors include the need to 1) further study the role of race/ethnicity on Pap smear screening compliance and other areas of health disparities; 2) expand the geographic scope of patients and the number of CHCs; and 3) incorporate additional patient, provider and organizational variables into the analysis such as patient health literacy, provider race/ethnicity and organizational culture. Further investigation of the role of race/ethnicity may provide more information in terms of the unique results found for Hispanic, black non-Hispanic and white non-Hispanic women in this study. The results for Hispanic women were at first a dramatic finding. However, when these results are considered in the context of the unique environment of South Florida, additional investigation is warranted. It is suggested that there may be meaningful variation in screening rates among Hispanic women from Cuba, versus other areas of South and Central America. To study this concept more in-depth would require a dedicated focus incorporating training and education of CHC admissions staff. While such an initiative

would be costly to implement, findings from an expanded Pap smear compliance study using these data could reveal important information regarding the need to target patient interventions at population sub-groups. In addition, expanding the geographic scope and the number of CHCs is recommended to allow for improved study rigor and to support extrapolation of results to the larger public health community. Finally, incorporating additional variables at multiple levels of care, such as patient health literacy, provider race/ethnicity and organizational culture, is recommended in order to identify those variables that play the most significant influence on the receipt of Pap smear screening.

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