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Racial and ethnic disparities in universal cervical length screening with transvaginal ultrasound

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Abstract

Objective—Determine if race or ethnicity is associated with missed or late transvaginal cervical length screening in a universal screening program.

Methods—Retrospective cohort study of nulliparous women with singleton gestations and a fetal anatomical ultrasound from 16-24 weeks' gestation from January, 2012 through November, 2013. We classified women into mutually exclusive racial and ethnic groups: non-Hispanic black (black), Hispanic, Asian, non-Hispanic white (white), and other or unknown race. We used log-binomial regression to calculate the risk ratio (RR) and 95% confidence interval (CI) of missed or late (≥ 20 weeks' gestation) screening vs. optimally-timed screening between the different racial and ethnic groups.

Results—Among the 2 967 women in our study population, 971 (32.7%) had either missed or late cervical length screening. Compared to white women, black (RR: 1.3; 95% CI:1.1-1.5) and Hispanic (RR:1.2; 95% CI:1.01-1.5) women were more likely to have missed or late screening. Among women screened, black (vs. white) women were more likely to be screened late (RR: 2.2; 95% CI: 1.6-3.1).

Conclusions—Black and Hispanic women may be more likely to have missed or late cervical length screenings.

Keywords

Transvaginal cervical length screening; universal screening program; racial/ethnic disparity; antenatal screening; risk of preterm birth

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Introduction

In developed countries preterm birth (defined as a live birth at less than 37 completed weeks of gestation) is the leading cause of infant mortality and morbidity. In the United States, 11.4% of infants are born prematurely [1]. The preterm birth rate varies significantly among racial and ethnic groups, ranging from 10.2% among non-Hispanic white women to 16.3% among non-Hispanic black women[1]. In addition to psychosocial [2,3] and environmental factors [4,5] that have been shown to be associated with racial and ethnic disparities in preterm birth, studies also have shown that minority racial and ethnic groups are less likely to initiate and receive antenatal health care that may help prolong their pregnancies [6–9]. Given the disproportionate share of preterm birth experienced by non-Hispanic black women, it is essential to identify disparities in antenatal health care utilization so that they can be addressed.

Short cervical length (usually defined as ≤25 mm) has been identified as a risk factor for preterm birth in pregnancies with both singleton and multiple gestations [10–12]. The American College of Obstetricians and Gynecologists (ACOG) recommends physicians measure cervical length starting at 16 weeks of gestation for women with a history of preterm birth and also consider doing so for women without a history of preterm birth [13]. Among women with singleton gestations, women with a short cervix may receive treatment in the form of a cervical cerclage or vaginal progesterone, which have been shown to prolong pregnancy for women with and without a history of preterm birth, respectively [14,15].

Our institution implemented a universal opt-out transvaginal cervical length screening program on January 1st, 2012. The protocol was to offer the screening to all women—regardless of whether they had a prior preterm birth. Cervical length screening was performed from 16 to 24 weeks of gestation at the time of the mid-pregnancy fetal anatomical ultrasound. Given that many racial and ethnic minority groups are less likely to initiate or receive various antenatal health care services, the objective of our study was to investigate whether women of certain racial or ethnic groups were less likely to receive cervical length screening or to be screened at a later gestational age.

Methods

We performed a retrospective cohort study of all nulliparous women with a singleton gestation who had a fetal anatomical ultrasound from January 1, 2012 through November 30, 2014. We defined a fetal anatomical ultrasound as an ultrasound that occurred from 16 to 24 weeks of gestation, in which both femur length and abdominal circumference were measured. In order to ensure that we captured the full window in which women should have received cervical length screening, women were only included in our cohort if their full 16 to 24 week gestational age window occurred during our study period. We abstracted all data from electronic medical records and categorized race and ethnicity into the following mutually exclusive groups: non-Hispanic black (black), Hispanic, Asian, non-Hispanic white (white), and other or unknown race.

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Women were considered to have undergone transvaginal cervical length screening if a cervical length measurement was present in the fetal anatomical ultrasound report. As earlier detection of a short cervix allows for longer exposure to progesterone we defined optimally-timed screening as screening that occurred from 16 to <20 weeks of gestation. We considered a cervical length screening that occurred at ≥20 weeks of gestation as late. Our primary outcome was a composite outcome of missed or late screening.

All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC). We used the chi-square test to assess whether demographic characteristics were associated with timing of cervical length screening. We used log-binomial regression to calculate the risk ratios (RR) and 95% confidence interval (CI) for the composite outcome of missed or late cervical length screening compared to optimally-timed screening. We also calculated RRs (95% CI) separately for missed screening and late screening compared to optimally-timed screening. We assessed the influence of variables that we believed to be strong risk factors for the primary outcome, including maternal age and insurance status. P-values <0.05 were considered statistically significant.

The institutional review board at Beth Israel Deaconess Medical Center approved this study.

Results

The transvaginal cervical length screening program reached widespread utilization (defined as two consecutive months in which >80% of eligible women were screened) after nine months at our institution. Once widespread utilization was achieved, the proportion of women who received the screening remained constant at about 80%.

During the study period, 2,967 nulliparous women with a singleton gestation had a fetal anatomical ultrasound from 16 to 24 weeks of gestation. The mean age among these women was 31.7 (5.4) years, and the distribution of race and ethnicity was 16.4% black, 6.4% Hispanic, 20.2% Asian, 42.3% white, and 14.7% other or unknown. Among women in the other or unknown group, 261 (59.7%) were of other race or ethnicity and 176 (40.3%) were unknown. Almost one third (32.7%) of the women who had a fetal anatomical ultrasound had a missed or late cervical length screening. Among these women, 779 (80.2%) had no screening and 192 (19.8%) had a late screening. Women who had a missed or late screening were more likely to be younger, black or Hispanic, and to have public insurance compared to those who had an optimally-timed screening (all p≤0.0005; Table I).

Black (RR: 1.3; 95% CI: 1.1-1.5) and Hispanic (RR: 1.2; 95% CI: 1.01-1.5) women were more likely to be have missed or late screenings compared to white women (Table II). Women who self-identified as other or unknown race and ethnicity were also more likely to have missed or late screenings compared to white women (RR: 1.3; 95% CI: 1.1-1.5). When we assessed the risk of missed screening only, though not statistically significant, black (RR: 1.2; 95% CI: 0.99-1.4) and Hispanic (RR: 1.2; 95% CI: 0.97-1.6) women were more likely to not receive a cervical length screening compared to white women, while the RR was 1.0 (0.86-1.2) for Asian women. With respect to late screening, we found that compared to white women, black women were significantly more likely (RR: 2.2; 95% CI: 1.6-3.1) to

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have a late screening, while the RR was 1.6 (0.90-2.7) for Hispanic women. Adjusting for maternal age and insurance status did not appreciably alter the risk ratio for the composite outcome of missed or late screening.

Discussion

Our study demonstrates that despite a universal transvaginal cervical length screening program, black and Hispanic women, as well as women who self-identify as other or unknown race, were more likely to have missed or late cervical length screening compared to white women. These findings appear to be driven by the increased risk of late cervical length screening, which is clinically meaningful as late screening may cause delayed initiation of progesterone treatment to prevent preterm birth. Although our findings also show that black and Hispanic women were more likely to not have a screening at all, this increased risk was not statistically significant. Our overall incidence of cervical length screening by transvaginal ultrasound (67.3%) is consistent with that reported in a previous study of the implementation of a universal transvaginal cervical length screening program [17].

Late cervical length screening can lead to delayed treatment. Both the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal medicine recommend that women without a history of preterm birth, who have an incidentally identified short cervix, should be treated with progesterone starting at ≤24 weeks of gestation [13,18]. We defined a late cervical length screening as one that occurred between 20 and 24 weeks of gestation, because a woman who was diagnosed with a short cervix during this window might not be able to initiate treatment until after 24 weeks of gestation. This might be especially true of black and Hispanic women who have been found to initiate other prenatal care services at later gestational ages [6–9].

Our findings are consistent with other literature on racial and ethnic disparities in the utilization of health care screening programs [7,19–21]. In a study published in 2008, Fowler et al. analyzed rates of overall and early syphilis screening among pregnant Medicaid participants in Florida and found that black and Hispanic women were significantly less likely to be screened at all and early in their pregnancy, compared to white women. Though there was no statistically significant difference after adjustment for age and length of enrollment in Medicaid, there remained a trend towards late and missed screening for black and Hispanic women [7]. We found that age and insurance status did not alter the risk of not having a cervical length screening among black and Hispanic women compared to white women.

Though our data do not allow us to differentiate between the women who did not receive the screening because they declined screening and those that were not offered the screening, our study highlights the need for more effective communication between providers and patients about the importance of screening. This is important for screening that may help target interventions for women at high risk of preterm birth, particularly given others have found that successful communication in the healthcare setting can vary by patient race and ethnicity [20,21]. In a secondary analysis of 710 women enrolled in a randomized controlled

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trial of the effect of a prenatal testing decision support guide, Bryant et al found that black and Hispanic women were less likely to report having a clear understanding that the screening and diagnostic tests offered were optional [19]. Additionally, the authors found that black and Hispanic women were less likely to even recall having had a discussion about screening and diagnostic testing, though these findings were only significant for Hispanic women with regards to diagnostic testing [19]. Furthermore, if providers are not clear about their recommendations, patients might opt out of screening. Roman et al found in their study of 514 black, Hispanic, and Arab women that lack of doctor recommendations were significantly associated with decreased odds of clinical breast exams, mammograms, and Papanicolaou tests [20].

Similar to previous reports, it may be that obtaining an optimally-timed screening at our institution is dependent on effective communication between providers and patients. All women who receive prenatal care at our hospital and associated health centers are scheduled for a fetal anatomic ultrasound from 16 through 20 weeks of gestation. Women may be more likely to attend these appointments during that gestational age window if providers explain the importance of receiving an optimally-timed cervical length screening and if women understand its importance. Effective communication about the role of cervical length screening and the importance of an optimally-timed cervical length screening may reduce the disparities we observed among black and Hispanic women in our study.

Strengths of our study include a large and diverse sample as it included not only the women who receive their prenatal care in the hospital, but also in affiliated community health centers and private practices. Our study also has several limitations. Due to the retrospective nature of this study, it is impossible to ascertain why women had a late screening or no screening at all. Furthermore, we were restricted to the data available from the medical record.

In conclusion, our study suggests that black and Hispanic women may have an increased risk of having missed or late cervical length screening, even when a universal screening program is in effect. While ACOG recommends routine cervical length screening for women with a history of a prior preterm birth, universal transvaginal screening has not been recommended for all populations. Nonetheless, even if cervical length is ascertained transabdominally, our finding that black and Hispanic women were more likely to have late cervical length screenings is important as this can delay initiation of progesterone treatment for prematurity. Future research should examine determinates of ultrasound timing. Furthermore, we recommend tracking the acceptance and adoption of screening protocols by patients and providers in order to ensure all patients have equal access. In the case of routine cervical length screening during pregnancy, such efforts could translate into reductions in racial disparities in preterm birth.

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Table I

Participant characteristics among nulliparous women with singleton gestations who underwent fetal anatomic ultrasound

	Optimally-timed cervical length screening n=1,996	Missed or late cervical length screening n=971	P
Race			0.0005
Black	301 (62.1)	184 (37.9)	
Hispanic	121 (63.4)	70 (36.7)	
Asian	416 (69.6)	182 (30.4)	
White	886 (70.5)	370 (29.5)	
Other/unknown	272 (62.2)	165 (37.8)	
Maternal Age			0.0003
<25	208 (59.3)	143 (40.7)	
25- <35	1,260 (69.7)	548 (30.3)	
≥35	528 (65.4)	280 (34.7)	
Insurance Status			0.0003
Private	1,115 (67.5)	538 (32.6)	
Public	532 (63.2)	310 (36.8)	
Other	349 (73.9)	123 (26.1)	

Data presented as n (%)

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Table II

Risk of missed and late cervical length screening compared to optimally-timed screening by race and ethnicity

	Missed or late cervical length screening		Missed cervical length screening		Late cervical length screening	
	Crude RR (95% CI)	Adjusted* RR (95% CI)	Crude RR (95% CI)	Adjusted* RR (95% CI)	Crude RR (95% CI)	Adjusted* RR (95% CI)
Black	1.3 (1.1-1.5)	1.2 (1.02-1.4)	1.2 (0.99-1.4)	1.1 (0.94-1.38)	2.2 (1.6-3.1)	1.6 (1.1-2.4)
Hispanic	1.2 (1.01-1.5)	1.2 (0.94-1.4)	1.2 (0.97-1.6)	1.2 (0.93-1.5)	1.6 (0.90-2.7)	1.2 (0.64-2.1)
Asian	1.03 (0.89-1.2)	0.97 (0.83-1.1)	1.0 (0.86-1.2)	0.98 (0.82-1.2)	1.1 (0.73-1.7)	0.87 (0.57-1.3)
White	Ref	Ref	Ref	Ref	Ref	Ref
Other/unknown	1.3 (1.1-1.5)	1.3 (0.83-1.1)	1.3 (1.1-1.5)	1.3 (1.1-1.5)	1.5 (0.99-2.3)	1.4 (0.94-2.2)

*Adjusted for maternal age and insurance status