

Predictors and Barriers to Timely Medical Follow-Up after Cardiovascular Disease Risk Factor Screening According to Race/Ethnicity

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Background: The purpose of this study was to assess follow-up practices among individuals found to have elevated cardiovascular disease (CVD) risk factors in a screening and educational outreach.

Methods: Participants in the National Heart, Lung and Blood Institute Family Intervention Trial for Heart Health (FIT Heart) who were found to have hypertension, prehypertension, sub-optimal lipids and/or abnormal blood glucose were included in this study (N=214, mean age 49 ± 13 , 64% female, 33% non-white). Contact was made at two weeks, six weeks and three months to determine if medical follow-up was initiated. Barriers to nonadherence were assessed.

Results: After two weeks, significantly more whites had medical follow up compared to nonwhites (34% vs. 20%, $p=0.04$). Racial/ethnic minorities were more likely to report that not having a doctor was a barrier (30% vs. 11%, $p=0.02$). Nonwhites were more likely to return to the study staff for follow-up rather than an outside physician (32% vs. 15%, $p=0.001$).

Conclusion: Racial/ethnic minorities with elevated CVD risk factors may have delayed medical follow-up compared to whites, and this may be attributable to lack of access to a doctor. These data suggest that improving access to care may reduce racial/ethnic disparities in risk factor management and CVD outcomes.

Key words: cardiovascular disease ■ prevention ■ barriers ■ minority health

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INTRODUCTION

Racial and ethnic minority populations in the United States have a disproportionate burden of death and disability related to cardiovascular disease (CVD).^{1,2} The prevalence of cardiac risk factors is greatest among ethnic minorities and those of lower socioeconomic status.^{3,4} Modifying these risk factors offers great potential for reducing CVD morbidity, disability and mortality.² Current strategies in the primary prevention of CVD include dietary and lifestyle changes, medication and continued medical evaluation of elevated risk factors.⁵ Medical follow-up and assessment of cardiac risk factors is essential in the prevention strategy. Thus far, it has not been well established if racial/ethnic differences exist in the rate of medical follow-up after CVD risk factor screenings. The purpose of this study was to assess differences in follow-up practices among a diverse sample of individuals with an elevated CVD risk factor profile found during a novel screening and educational outreach program targeted to family members of patients hospitalized with CVD, which may represent a motivational moment for preventive action.

Previous research on timeliness of medical follow-up among minorities has been studied within the context of other chronic diseases such as breast and cervical cancers. Delays in follow-up after cancer screenings have been found to contribute to racial/ethnic disparities in measurable outcomes. In a study of primarily minority women diagnosed with an abnormal mammogram, Battaglia et al. found that factors associated with timely medical follow-up included having an abnormal test result, being older, having private insurance and being referred from a hospital-based practice.⁶ In another study among minority, low-income women, race, country of birth, financial issues, fear of pain and difficulty navigating the healthcare system were barriers to follow up.⁷ McCarthy et al. found that inadequate follow-up of abnormal mammography was associated with no history of previous mammogram and a lower household income.⁸ According to Jones et al., African-American race/ethnicity, pain during mammogram and lack of a usual care provider were significant independent predic-

tors of inadequate medical follow-up.⁹

These data document that delayed follow-up among minorities has been observed, and they provide proof of concept that racial/ethnic minorities may have similar delays in follow-up for elevated CVD risk factors. Few data have evaluated barriers to prevention in free living, urban racial/ethnic minority populations.¹⁰ The purpose of this study was to determine the rate of follow-up among an ethnically diverse sample with elevated risk factors for CVD. A secondary objective was to evaluate individual and system level barriers that may inhibit prevention strategies in this population.

DESIGN AND SUBJECTS

This was a follow-up study of minority and white participants who enrolled in the National Heart, Lung and Blood Institute (NHLBI)-sponsored Family Intervention Trial for Heart Health (FIT Heart) who were randomized into a special intervention group and found to have elevated CVD risk factors upon baseline screening (N=214; mean age 49 ± 13 years, 64% female, 33% minority). Briefly, FIT Heart is a one-year randomized controlled clinical trial among family members/cohabitants of patients hospitalized with CVD at New-York-Presbyterian Hospital/Columbia University Medical Center. The purpose of FIT Heart was to test the effectiveness of a hospital-based standardized screening and educational intervention to increase adherence to national CVD prevention goals versus usual care. The study was approved by the institutional review board of Columbia University Medical Center.

Each participant completed a standardized questionnaire, including demographic data; past medical history; lifestyle (i.e., smoking, physical activity); medication use; family history of CVD; employment status; marital status; language preference; country of birth; and, if foreign born, year of immigration. Additionally, level of

acculturation was assessed using items taken from the Short Acculturation Scale for Hispanics (SASH) developed by Marin and colleagues. Respondents answered four language frequency-based questions using a five-point Likert scale. A total score was calculated and averaged resulting in a mean score. A mean score of <3 indicated less acculturated and ≥3 indicated more acculturated.¹¹ Our operational definition of acculturation is the process by which immigrants adopt the attitudes, values, customs, beliefs and behaviors of a new culture.¹²

Bilingual staff members were available to assist Spanish-speaking participants, and all forms were available in both English and Spanish. Trained healthcare professionals performed standardized cardiovascular risk factor screenings, including blood pressure, body mass index, waist circumference, fasting lipids, and glucose in the Columbia University General Clinical Research Center using standard protocol.

Participants randomized into the special intervention arm of the study (N=250) were given immediate feedback of CVD risk factors and were counseled on lowering their risk; those who had elevated lipids and/or blood pressure were recommended to follow-up with their healthcare providers.

Lipid and Glucose

Plasma glucose and lipids (total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides) were evaluated immediately using fingerstick technology and measured on Cholestech LDX Analyzers (Hayward, CA), which are waived from laboratory licensing, validated and are commonly used in health screenings. The Cholestech procedure involved using a lancet to obtain one drop of blood from the participant's fingertip. Results were available in <5 minutes.¹³ Based on national guidelines, dyslipidemia was defined as a total cholesterol ≥200 mg/dL and/or an HDL cholesterol ≤50 mg/dL for

Table 1. Characteristics and CVD risk factors among white and nonwhite participants

Characteristic	Participant (N=214)	
	White (N=143) N (%)	Nonwhite (N=71) N (%)
Age (mean ± SD)	51.4 ± 12.8	43.8 ± 11.8
Female	90 (62.9)	47 (66.2)
> High-school education	139 (98.6)	63 (90.0)
Employed/student	102 (71.3)	47 (66.2)
Married/living with someone	108 (76.1)	42 (60.0)
No health insurance	14 (9.9)	18 (25.4)
Foreign born	24 (16.9)	44 (62.0)
Lived in the United States >10 years (among foreign born)	19 (79.2)	35 (79.5)
English language preference	134 (94.4)	31 (43.7)
Acculturated	135 (94.4)	40 (56.3)
Total cholesterol >200	63 (44.1)	28 (39.4)
LDL >100	106 (74.1)	50 (70.4)
Blood pressure >140/90	40 (28.0)	16 (22.5)

women, ≤ 40 mg/dL for men and/or an LDL-cholesterol > 100 mg/dL and/or triglycerides > 150 mg/dL fasting. Elevated glucose was defined as < 100 mg/dL.¹⁴ Venous blood samples were also drawn and analyzed by clinical research staff. Cholestech measurements are highly correlated to lab-analyzed values.¹⁵

Blood Pressure

Trained staff was instructed to measure blood pressure while the participants sat with arm unrestricted by clothing and legs uncrossed. Participants were asked to relax arm muscles and rest for 1–2 minutes before blood pressure was taken by trained hospital personnel. A single systolic and diastolic blood pressure was recorded on a standardized data entry form. Extra-large cuffs were available and utilized on an as-needed basis per standard protocol. Elevated blood pressure was defined as a systolic blood pressure ≥ 120 mmHg or a diastolic blood pressure ≥ 80 mmHg based on national guidelines.¹⁶

Follow-Up Data Collection

All special intervention participants were contacted by phone at two weeks, six weeks and three months postbaseline screening. Those participants with elevated CVD risk factors at baseline who had been advised to follow-up with a physician were asked if they had done so at each follow-up point. Several attempts were made to reach all participants by phone. Barriers to medical follow up were assessed using close-ended responses. Answer categories included not having a doctor, not having transportation, financial hardship, feeling well, too busy caring for others, too busy with work, not trusting healthcare provider or not liking healthcare provider. Additionally, participants were given the option of “other” to describe barriers to follow-up that were not listed on the questionnaire. At three months, participants

with elevated CVD risk factors were invited back to the study site to retest lipids and glucose.

Data Management and Statistics

All data were collected on standardized forms and double entered into a Microsoft® Access™ database then exported to SAS version 9.1 (SAS Institute Inc., Cary, NC) for analysis. Categorical data are presented as frequencies and percentages. Continuous data are presented as means and standard deviations. Descriptive statistics were performed for all variables and summarized using frequency distributions. Demographic information, CVD risk factors, rate of follow-up at individual time point and barriers to adherence to medical follow-up were stratified by white versus nonwhite participants. Comparisons across race/ethnic groups were conducted using either Chi-square or Fisher's exact test for categorical variables. Logistic regression equations were calculated with each of the demographic characteristics and CVD risk factors as predictor variables and rate of nonadherence to medical follow-up as the dependent variable. Multivariate analyses were used to identify the association of predictor variables and the rate of medical follow-up. Models were adjusted for potential confounders, including age, employment and language preference. All analyses were two sided, with a statistical significance level set at $p=0.05$.

RESULTS

The demographic characteristics and CVD risk factors of intervention subjects with suboptimal lipids, glucose and/or blood pressure enrolled in FIT Heart are provided in Table 1 by racial/ethnic status. The majority of the subjects were women (64%), and 33% were racial/ethnic minorities. Almost one-quarter (22%) of our minority cohort were Hispanics predominately of

Table 2. Percent of participants with abnormal risk factors who had medical follow-up as recommended by race/ethnicity

	White 143 (66.8%)	Nonwhite 71 (33.2%)	P Value	Missing
Participants (N=214)	N (%)	N (%)		N (%)
Time Point ^a				
2 week	47 (34.3)	13 (20.31)	0.0434*	13 (6.1)
6 week	45 (38.5)	21 (37.5)	0.9030	41 (19.2)
3 month	58 (48.3)	35 (60.3)	0.1327	36 (16.8)
3-month visit	25 (21.0)	24 (41.4)	0.0045*	37 (17.3)
Cumulative ^a				
2 week	47 (34.3)	13 (20.3)	0.0434*	
6 week	66 (46.8)	25 (36.8)	0.1700	
3 month	83 (58.0)	43 (60.6)	0.7241	
3-month visit	94 (65.7)	50 (70.4)	0.4913	
3-month visit study site only ^b	22 (15.4)	23 (32.4)	0.0099*	37 (17.3)

a: The follow-up rate is calculated excluding missing data; b: Percent of follow-up was calculated excluding missing data;

* Significantly different at < 0.05 , two sided

Dominican decent. The majority of participants were born in the United States (68%), specified English as their language of preference (77%) and were highly acculturated (82%). Most participants were age <65 years (88%) and were married or living with a partner (70%). There were no significant differences in CVD risk factors documented between whites and racial/ethnic minorities.

Table 2 describes the rate of medical follow-up by white versus nonwhite participants at each time point and cumulatively. At two weeks postscreening, significantly more whites obtained medical follow-up compared to nonwhites (34% vs. 20%, $P=0.04$). There were no significant differences by race/ethnicity at the six-week time point. However, as shown in Table 2, there were significantly more racial/ethnic minorities who returned to the study site at three months for medical follow-up rather than seeking care from a personal healthcare provider (32% vs. 15%, $p=0.001$). As shown in Table 3, at each time point racial/ethnic minorities were more likely to report that not having a doctor was a barrier to medical follow-up: two weeks (30% vs. 11%, $p=0.017$), six weeks (30% vs. 5%, $p=0.001$) and three months (38% vs. 7%, $p=0.003$). At the six-week point, a barrier to nonfollow-up cited more frequently among white participants was that they "felt well" (60% of whites vs. 38% of nonwhites, $p=0.041$). Denominators are different at each time point (Table 3) due to differing response rates at the two-week, six-week and three-month points of contact. In logistic regression models shown in Table 4, independent predictors of nonadherence to follow-up recommendations at two weeks were: younger age, ($p=0.006$), unemployment ($p=0.02$) and not speaking English ($p=0.04$). Race/ethnicity did not remain a sig-

nificant predictor of rate of medical follow-up after controlling for these confounding factors or possible factors in the causal pathway.

DISCUSSION

In our sample, 67% of the 214 participants with elevated CVD risk factors obtained medical follow-up within three months of their initial CVD screening. The rate of cumulative follow-up among white versus nonwhite participants within three months was not significantly different (65% of whites vs. 70% of nonwhites). This high level of follow-up among minorities may be attributable to the access to medical care made readily available by the study research staff. For those that did not obtain medical follow-up, the most prevalent barrier cited among racial/ethnic minorities was not having a doctor, while the biggest barrier for white participants was feeling well. The provision of no-cost medical services and bilingual staff may be instrumental in helping minorities follow-up with clinical recommendations regarding CVD prevention.

In this study, racial/ethnic minorities communicated that not having a doctor was a major barrier to medical follow-up. This data is consistent with other studies which have found healthcare system barriers, lack of medical insurance and/or lack of a doctor to be associated with lower utilization of medical follow-up and preventive services. In a study on CVD prevention among Latinos and Hispanics, Davidson et al. found that a barrier to providing effective preventive care in this population was the lack of health insurance or a regular source of healthcare.¹⁷ On a national level, there is a disproportionate number of ethnic minorities who do not have health insurance and/or a healthcare provider. Reports

Table 3. Barriers to follow-up among participants with abnormal risk factors by race/ethnicity^a

Barriers	White	Nonwhite	P Value
	N (%)	N (%)	
2 Week (n=101)	64 (63.4)	37 (36.6)	
No time	21 (32.8)	13 (35.1)	0.8119
No doctor	7 (10.9)	11 (29.7)	0.0174*
Other	36 (56.3)	13 (35.1)	0.0408*
6 Week (n=87)	57 (65.6)	30 (34.5)	
Feel well	34 (59.6)	11 (36.7)	0.0414*
No MD	3 (5.3)	9 (30.0)	0.0015*
Too busy with work	5 (8.8)	4 (13.3)	0.5067
Caring for others	6 (10.5)	2 (6.7)	0.7091
Logistical reasons	9 (15.8)	4 (13.3)	0.7600
3 Month (n=65)	57 (67.7)	21 (32.3)	
No time	15 (34.1)	5 (23.8)	0.4010
No doctor	3 (6.8)	8 (38.1)	0.0033*
No transportation	0	0	—
Financial reasons	0	0	—
Other	26 (59.1)	8 (38.1)	0.1130

a: Analysis was conducted excluding missing data; * Significantly different at <0.05, two sided

published by the Kaiser Family Foundation found that one-third of Hispanics and 21% of African Americans are uninsured, compared to 13% of whites. Additionally, these reports indicate that individuals without insurance and/or a healthcare provider are less likely to receive preventive care.^{18,19}

Our study has limitations that should be considered. Although a large, diverse sample of minorities was included, subgroup analyses contributed to a smaller sample size that was further limited by factors such as loss to follow-up. In certain comparisons, our small sample size may have contributed to limited power to detect differences among groups. A power calculation was conducted for the primary outcome of LDL cholesterol reduction in our overall randomized controlled trial of 500 persons. Since we showed significant differences in medical follow-up by race/ethnicity in this substudy, the power was deemed sufficient to test the hypothesis.

On average, our racial/ethnic minority cohort was 10 years younger than our white sample. FIT Heart was a randomized clinical controlled trial, and the age differences between groups should be considered random. All of the subjects in this study were relatives of patients hospitalized with CVD. The family members of our non-white cohort may have been younger on average than our white cohort of hospitalized patients, which would account for the age differential. After adjustment for age, however, race was still a significant predictor of nonfollow-up due to the lack of a primary care physician as cited among minorities.

The literature on barriers to medical follow-up to date is primarily focused on women who had abnormal breast

and cervical cancer screening test results. Our study contributes to the breadth of research focused on CVD prevention and follow-up. Additionally, the racial/ethnic minorities in the studies on breast and cervical cancers tend to focus on women from Mexico and/or Central America. Our study had a large population of Hispanics from the Dominican Republic, which can add to the representation of this subgroup in health research. Furthermore, our sample included racial/ethnic minority males, while previous researched has focused on women.

Ideally, the same barrier response choices should have been asked at each follow-up point in our study. A standardized instrument to measure these barriers would have been helpful, and the development of this instrument warrants further research and development. The lack of a standardized tool is likely due to the inherent subjective nature of perceived barriers. This study should be used as a tool to identify factors associated with nonadherence to prevention goals.

Additionally, we assessed family members/cohabitants of patients hospitalized with CVD, which may be a select population. However, to the author's knowledge, this study is the first of its kind to reach out to racial and ethnic minorities who have family members hospitalized with CVD in this capacity. The introduction of screening and educating family members at a unique and motivational moment (while family is hospitalized) is important to test, as it may have clinical utility and can be easily integrated as a tool for the primary prevention of CVD. Additionally, few data have tracked a diverse cohort of racial/ethnic minorities and addressed barriers to follow-up as we have done.

Table 4. Logistic regression of follow-up rate on risk factors at two weeks

	Coefficient β	P Value
Age (<65 vs. \geq 65)	0.7114	0.1032
Age as continuous variable	-0.0414	0.0011*
Gender (female vs. male)	-0.2922	0.3718
Race (nonwhite vs. white)	0.7142	0.0458*
Education (\leq high school vs. > high school)	-0.5673	0.4670
Employed/ student (no vs. yes)	0.4642	0.1900
Married/living with someone (no vs. yes)	0.5517	0.1377
Have health insurance (no vs. yes)	0.7183	0.1685
Foreign born (yes vs. no)	0.5069	0.1519
Lived in United States >10 years (no vs. yes)	-0.00906	0.9903
English speaking (no vs. yes)	1.0986	0.0201*
Acculturated (no vs. yes)	0.9198	0.0742
LDL (>160 vs. \geq 100 and \leq 160)	-0.2297	0.6176

Any variable with tested p value <0.25 will be included in multiple logistic regression model along with variables of clinical importance (age, gender, race, etc).

By the stepwise selection method, the final model is:

	Coefficient β	P Value	OR
Age (continuous)	-0.05	0.0006	
Employment (no vs. yes)	0.9613	0.0209	2.6
English speaking (no vs. yes)	1.0584	0.0422	2.9

Because many of the individuals included in our sample were the primary caregivers of patients hospitalized with CVD, this may not have been the opportune timeframe to schedule personal follow-up medical appointments. A better assessment might have looked at data within six months of initial screening.

In conclusion, we documented that racial/ethnic minorities with elevated CVD risk factors had lower rates of medical follow-up, which may largely be explained by the burden of CVD at younger ages. Minority respondents cited that the lack of a primary care physician was a major barrier to follow-up more readily than whites even after adjusting for age differences. Identifying groups who are most at risk for non-follow-up is essential to establishing appropriate public health interventions. Educational interventions should be targeted to racial/ethnic minorities, as this may lead to improved health outcomes and a reduction in CVD health disparities.

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