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A Randomized Community-based Intervention Trial Comparing Faith Community Nurse Referrals to Telephone-Assisted Physician Appointments for Health Fair Participants with Elevated Blood Pressure

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OBJECTIVE: To measure the effect of faith community nurse referrals versus telephone-assisted physician appointments on blood pressure control among persons with elevated blood pressure at health fairs.

METHODS: Randomized community-based intervention trial conducted from October 2006 to October 2007 of 100 adults who had an average blood pressure reading equal to or above a systolic of 140 mm Hg or a diastolic of 90 mm Hg obtained at a faith community nurse-led church health event. Participants were randomized to either referral to a faith community nurse or to a telephone-assisted physician appointment. The average enrollment systolic blood pressure (SBP) was 149±14 mm Hg, diastolic blood pressure (DBP) was 87±11 mm Hg, 57% were uninsured and 25% were undiagnosed at the time of enrollment.

RESULTS: The follow-up rate was 85% at 4 months. Patients in the faith community nurse referral arm had a 7±15 mm Hg drop in SBP versus a 14±15 mm Hg drop in the telephone-assisted physician appointment arm ($p=0.04$). Twenty-seven percent of the patients in the faith community nurse referral arm had medication intensification compared to 32% in the telephone-assisted physician appointment arm ($p=0.98$).

CONCLUSIONS: Church health fairs conducted in low-income, multiethnic communities can identify many people with elevated blood pressure. Facilitating physician appointments for people with elevated blood pressure identified at health fairs confers a greater decrease in SBP than referral to a faith community nurse at four months.

KEY WORDS: community-based intervention; hypertension; health fairs; disparities.

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BACKGROUND

Racial disparities exist in the prevalence, diagnosis, treatment and control of hypertension.^{1–12} Poorly controlled hypertension can increase the risk of stroke, heart disease, kidney disease and overall mortality.^{13–16} In an effort to decrease disparities in hypertension, organizations have used health fairs in underserved communities to promote awareness, offer screenings, and disseminate health education.

Faith community nurses work to improve the health of their communities and may help eliminate disparities in health by counseling patients and facilitating access to care.^{17–32} Their services may be particularly important in poor communities where congregants lack a usual source of care and experience many delays in accessing care.¹⁶

In this study, we compare referrals to faith community nurses to telephone assistance with making physician appointments. Telephone-based interventions have been effective in improving care and outcomes in disadvantaged persons with chronic conditions.^{33–35} We chose to measure change in systolic blood pressure to assess if these interventions would have an effect on a major clinical outcome. We also measured more proximal outcomes, such as medication adherence, medication intensification, and self-care, to measure processes of care. To our knowledge this is the first randomized trial that has evaluated a follow-up intervention for health fair participants identified as having uncontrolled blood pressure. Using a community-based participatory research approach, we examined the effect of referrals to faith community nurses versus telephone-assisted physician appointments among individuals identified as having elevated blood pressure on the following: 1) systolic blood pressure control; 2) antihypertensive medication intensification; 3) knowledge about hypertension; and 4) participation in self-care. Testing these two interventions allows us to assess if a faith community nurse forming a relationship with participants, educating them on hypertension, and linking them to care is more beneficial than linking participants directly to medical care.

METHODS

We established a collaborative partnership with an established faith community nurse program in Los Angeles through

QueensCare, a nonprofit organization that manages a number of safety net clinics and has several community outreach programs. QueensCare hires registered nurses to serve as faith community nurses at partnered churches. These nurses hold office hours at the churches and deliver services to the community. The nurses were not selected or trained for this study since they were already a part of a program operating in the community.

The academic team worked with the faith community nurses in identifying the research question, determining the study measures, designing the study, recruiting participants, and analyzing the results. We conducted a randomized intervention trial and enrolled participants from faith community nurse sponsored health fairs at churches. Participants were recruited from October 2006 to June 2007 and followed-up from February 2007 to October 2007. Participants who were eligible for the study provided written informed consent. The UCLA institutional review board approved all study procedures, and this trial was registered at clinicaltrials.gov identifier NCT00535444.

Participants

From October 2006 to June 2007, we measured blood pressures of 886 health fair participants 18 years or older at 26 health fairs at 11 churches in Los Angeles County. The nurse-led church health fairs were diverse. They attracted a variety of health fair participants and offered a range of health services and health information.

Figure 1 depicts the screening and enrollment process for the study. One hundred eighty seven participants had an average of the last two of three blood pressure readings equal to or over 140 mm Hg systolic or 90 mm Hg diastolic according to the Multiple Risk Factor Intervention Trial protocol.³⁶ Of these participants, 37 met exclusion criteria due to inability to speak English or Spanish, being pregnant, unable to give informed consent, unable to attend the follow-up appointment, or having visited a faith community nurse within the last six months. Fifty eligible participants were not interested due to lack of interest, lack of time, or wanting to see their own physician. Of the 100 enrollees, 50 participants were randomly assigned to each intervention arm. The non-enrollees and enrollees did not differ in age, gender, race/ethnicity or systolic or diastolic blood pressure.

Interventions

We worked with our community partners to devise a comparison intervention that would best allow us to measure faith community nurse referrals without having a usual care arm, which in this uninsured and underinsured population would translate to no care. We chose to compare faith community nurse referrals to a minimal primary care physician referral intervention. Upon enrollment, participants were randomly assigned to the following: referral to a faith community nurse or telephone assistance with making a physician appointment. The participants, the faith community nurses, and the physicians were not blinded to the randomization arm. Figure 2 describes the flow of participants through the faith community intervention arm. Figure 3 in the online appendix describes the

flow of participants through telephone-assisted physician appointment arm.

Faith Community Nurse Intervention. Participants randomized to the nurse referral arm were introduced to the nurse at the health fair, were given a letter with her contact information, and were encouraged to see her at least once during the next two weeks. All the faith community nurses were registered nurses and were not licensed to prescribe or dispense medications to participants. The nurses followed their standard protocol for referring a participant with hypertension (See Fig. 4 in the online appendix). The nurses could incorporate spiritual aspects into their patient encounters, but we did not obligate them to use faith in caring for their patients.

Telephone-Assisted Physician Appointment Intervention. Participants randomized to the telephone-assisted physician appointment arm received telephone assistance in making an appointment with their primary care physician (PCP). If the participant did not have a PCP, the research assistant assigned the participant to a PCP in a free-clinic in the community. Since the recruitment occurred on Sundays, the research assistants made appointments during the week and relayed the time and date of the appointment to the study participant through a phone conversation, a mailed letter, or a phone message. The participant could also elect to keep an appointment they already had with their physician or make their own appointment.

Data Collection and Outcome Measures

Trained research assistants who were blinded to the randomization arm enrolled participants into the study at the health fairs. After enrollment and collection of baseline measures, the research assistants gave participants a sealed envelope that revealed their randomization arm. Participants received monthly flyers thanking them for their participation and reminding them of their follow-up appointment. Participants also received a reminder phone call one week and three days prior to the follow-up appointment. Follow-up measurements were obtained 4 months post-randomization by a new set of trained research assistants who were blinded to the study objectives and the participant's randomization assignment.

Demographic Characteristics. We measured participant age, gender, and race/ethnicity, employment status, income, educational attainment, and marital status. Participants reported their type of health insurance, smoking status, and primary language spoken. Patients also reported having a usual source of care, having seen a physician in the past month, having a family history of hypertension, and having a diagnosis of hypertension, diabetes, or heart disease. We used patient self-report to determine a known diagnosis of hypertension.¹⁻⁴

Service Use.

Provider Visits. Physician visits' attendance was measured by participant self-report. We verified attendance at nurse office hours through patient self-report and nurse record review.

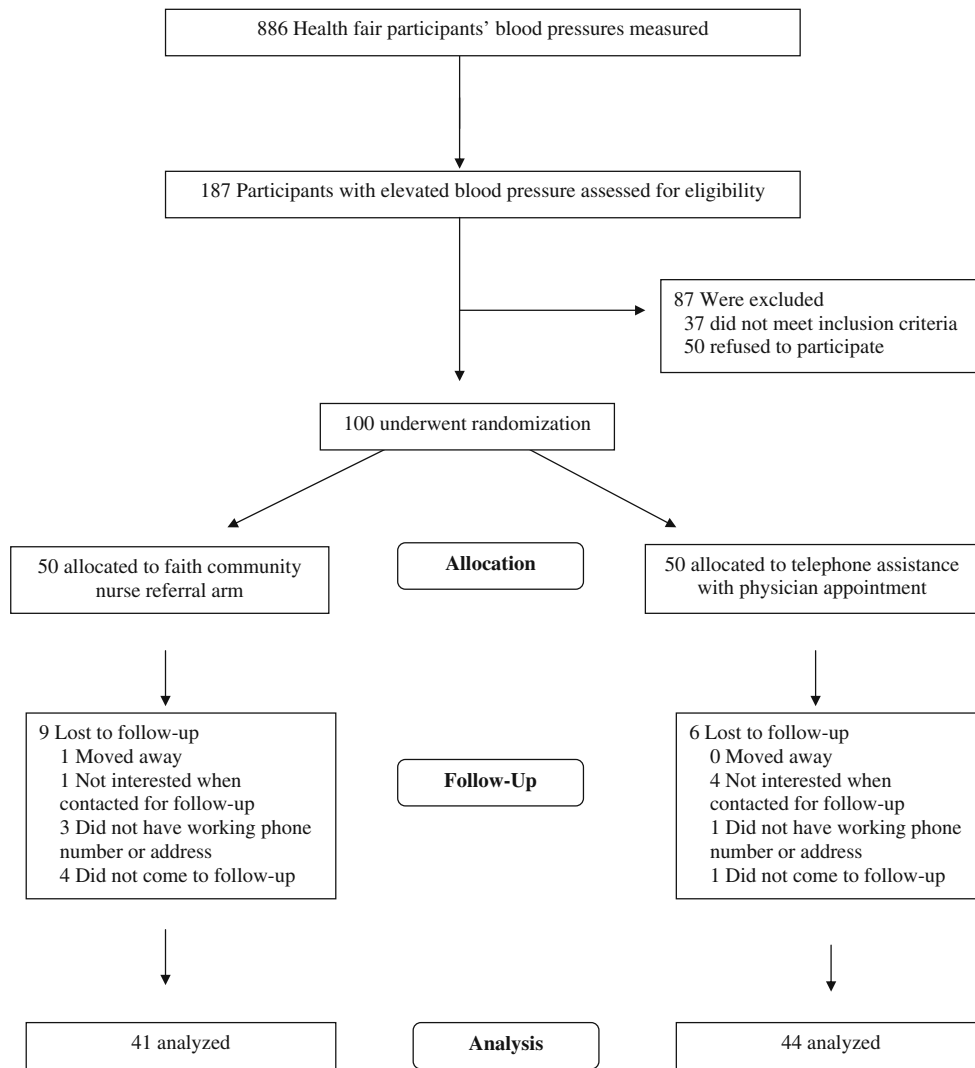


Figure 1. Recruitment and enrollment flow diagram.

Counseling. We asked patients in the follow-up interview about counseling services provided by their physician and the faith community nurse.

Hypertension Outcomes.

Blood Pressure Change. The primary outcome was change in systolic blood pressure from recruitment measured at the 4-month follow-up appointment.

Medication Intensification and Adherence. Medication intensification was defined as having an increase in the number of blood pressure medications or an increase in dosage of a given antihypertensive medication from recruitment to the 4-month follow-up appointment. Medication adherence was asked with the following question: “On how many of the past 7 days did you take your recommended blood pressure medication?”³⁷ Participants could report zero to 7 days.

Hypertension Knowledge. We could not identify a short, reliable, and valid measure of hypertension knowledge, so we adapted six validated diabetes-specific knowledge questions from the Michigan Diabetes Research and Teaching Center (MDRTC) public use web site.³⁷ We used the format of the MDRTC knowledge scale but changed the content to reflect hypertensive-specific content. The score on the knowledge test ranged from 0% to 100% reflecting the percentage of questions correct on the test per the instrument scoring guidelines. The Cronbach alpha for this scale was 0.65.

Hypertension Self-care. Those who had a known diagnosis of hypertension at recruitment also completed questions regarding hypertension self-care behaviors. We adapted validated self-care questions from the MDRTC diabetes self care survey and changed the content to reflect hypertensive self-care.³⁸ Participants indicated whether or not they had undertaken seven self-care behaviors (score: 1 = yes, 0 = no).

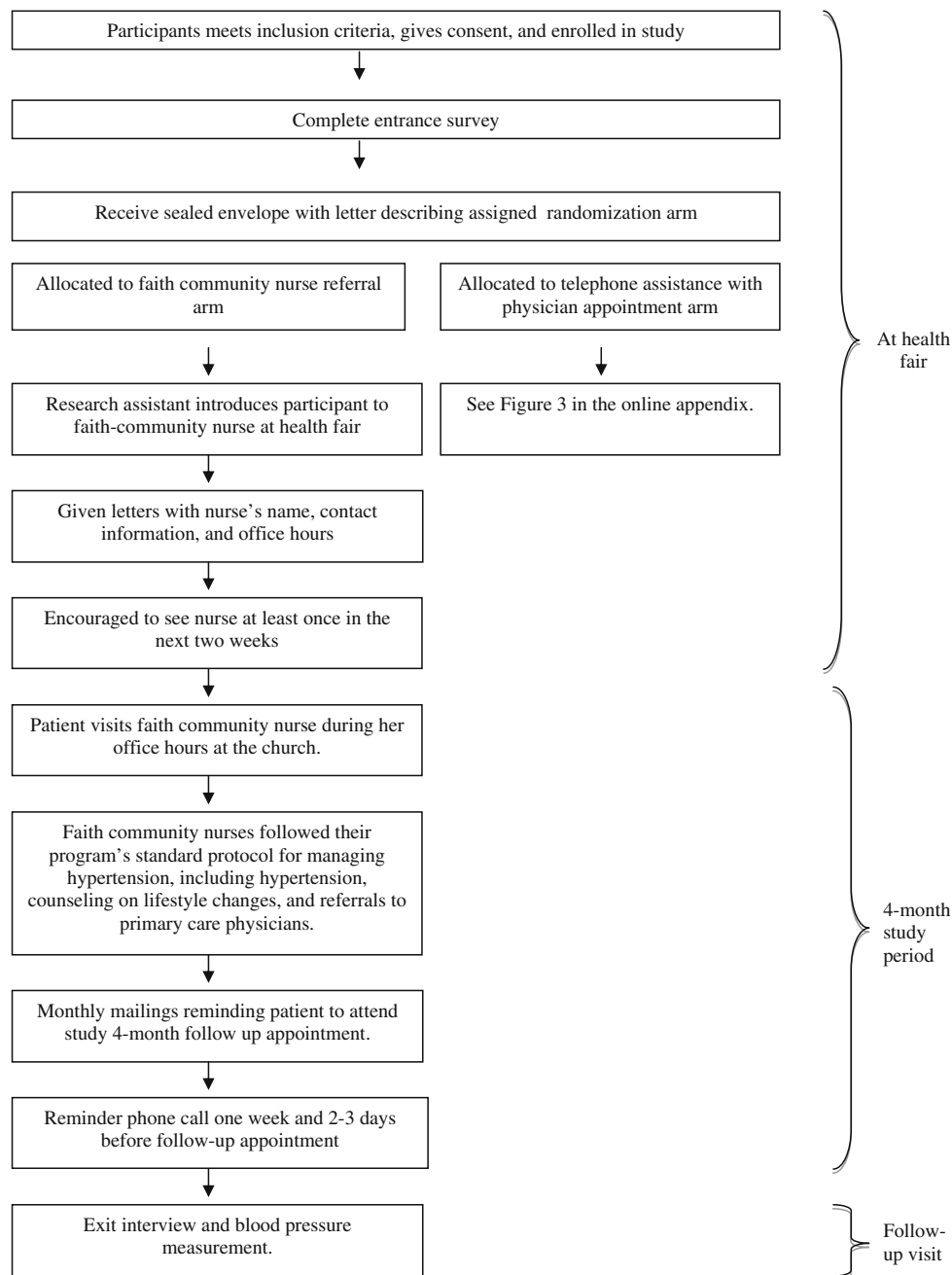


Figure 2. Flow of patients assigned to faith community nurse intervention.

The seven responses were then averaged for a composite self-care score that ranged from zero to one per the instrument scoring guidelines.

Data Analyses

We assessed whether there was variation in demographic and/or health characteristics by whether a person consented to participate or not. We also used univariate tests for two independent samples to compare the distribution of demo-

graphic and clinical characteristics by study arm. Counseling outcomes were analyzed as dichotomous variables using chi-squared tests. Difference in systolic blood pressure from enrollment to follow-up was tested as a change score, comparing means using unadjusted t-tests between the two interventions. We did conduct analyses accounting for clustering by faith community nurse and found no difference in our primary outcome. Medication intensification was analyzed as a dichotomous variable (having had medication intensification or not) for each participant and tested using chi-squared tests between the two interventions groups. Medication adherence was analyzed as a change score, comparing means using unadjusted t-tests between the two study arms. We analyzed

knowledge score and self-care score as differences from enrollment to follow-up as change scores using unadjusted t-tests to test means.

All participants with available follow-up blood pressure readings and interview data were analyzed within the group they were assigned. A target sample size of fifty participants in each arm assumed a 12.5 mm Hg difference in drop in systolic blood pressure between the two intervention arms with a power of 0.80. We conducted our analyses using STATA 10.0 (StataCorp, College Station, Texas) and SAS, version 9.1 (SAS Institute Inc, Cary, North Carolina), and $p < 0.05$ was considered significant.

RESULTS

The sample was predominantly over 45 years of age and of ethnic minority backgrounds (Table 1). About one-third of the participants did not hold a high school degree. The majority of the participants reported an annual income less than \$30,000. About half of the participants had health insurance and the majority reported a usual source of care, though only about one-third had seen a physician in the past 4 weeks. Most had a family history of hypertension and a known diagnosis of hypertension, though less than half were on antihypertensive medications. About one-fifth also reported a diagnosis of

diabetes or heart disease. The majority of the participants stated they were in poor or fair health.

Eighty-five of the participants attended the 4-month follow-up appointment at the church where they were recruited. One participant had a follow-up interview but did not have blood pressure measured. The participants who came to the follow-up appointments did not differ from the ones who were loss to follow-up in terms of pre-intervention blood pressure readings, gender, race/ethnicity, educational attainment, income, or insurance status. Attrition did not differ across treatment arms.

Service Use

Physician Visits. The study team made appointments for 20 of the 50 participants in the physician referral arm. Twenty-five participants in the physician referral arm kept an appointment they had and five made their own appointment. During the study period, 68% of the participants in the nurse referral arm visited a physician or spoke to one on the phone versus 80% in the telephone-assisted physician appointment arm ($p=0.24$). Participants in the telephone-assisted physician appointment arm saw a physician within 34 ± 30 days from being recruited to the study. In the telephone-assisted physician appointment arm, participants had the same likelihood of visiting a physician or speaking to one on the phone irrespective of

Table 1. Descriptive Data for Study Participants (N=100)

	Faith community nurse referral arm N=50	Telephone-assisted physician appointment arm N=50
	Mean (SD) or N (%)	Mean (SD) or N (%)
Age	58(9)	57(13)
Female	36(72)	32(64)
Race or ethnic group		
Caucasian	3(6)	7(14)
Hispanic	30(60)	32(64)
African-American	4(8)	1(2)
Asian/Pacific Islander	12(24)	10(20)
Other	1(2)	0(0)
Born outside of United States	41(82)	42(84)
English spoken at home	12(24)	12(24)
Have a high school degree or GED	31(62)	30(60)
Married or living with partner	25(50)	22(44)
Income greater than \$30,000*	4(8)	6(12)
Employed (full time or part time)	28(56)	28 (56)
Currently have health insurance	27(54)	24(48)
Have a usual source of care	41 (82)	40 (80)
Have seen a physician in past 4 weeks	17 (34)	19(38)
Family history of hypertension	31(62)	29(58)
Known diagnosis of hypertension	37(74)	38(76)
On antihypertensive medication	24(48)	23(46)
Of past 7 days, how many days took antihypertensive medications ^a	6.6(1.39)	6.4(1.88)
Have never smoked	35(70)	35(70)
Self-reported health status fair or poor	29(58)	25(50)
Systolic blood pressure	148(15)	149(11)
Diastolic blood pressure	89(11)	86(10)
Score on knowledge test	62(27)	65(26)
Self-care score	0.8(0.25)	0.7(0.29)

Due to rounding, percents may not add up to 100. Plus-minus values are means \pm SD. Continuous variables were compared with the use of a two-sample t-test. Categorical variables were compared with the use of a chi-square test

*Four participant in the faith community nurse referral arm and 12 in the telephone-assisted physician appointment arm did not report their income

^aFour participants in the faith community nurse referral arm and three participants in the telephone-assisted physician appointment arm reported being on antihypertensive medications but did not report how many of the past 7 days they took their medications

having been given an appointment by the study team, keeping one they had or making their own ($p=0.15$).

Nurse Visits. Forty-four percent of the participants in the nurse referral arm visited or spoke with a nurse at their church versus 27% in the telephone-assisted physician appointment arm ($p=0.11$). Participants in the faith community nurse referral arm saw a nurse within 28 ± 30 days of recruitment.

Counseling. Patients reported medication counseling at similar rates, irrespective of study arm (Table 2). Participants in the faith community nurse referral arm were more likely to report that they had received dietary and exercise counseling. Due to the low prevalence of alcohol use and tobacco use in this patient population, patient reported physician and nurse counseling in these areas was very low.

Hypertension Outcomes

Blood Pressure Change. Participants in the faith community nurse referral arm had an average decline of 7 ± 15 mm Hg in systolic blood pressure versus a decline of 14 ± 15 mm Hg in the telephone-assisted physician appointment arm ($p=0.04$). The participants in the faith community nurse referral arm had an average drop of 3 ± 9 mm Hg in diastolic blood pressure compared to 6 ± 8 mm Hg in the telephone-assisted physician appointment arm ($p=0.11$).

Medication Intensification and Adherence. Rates of medication intensification (27% vs. 32%, $p=0.62$) were similar across the nurse referral and telephone-assisted physician appointment

arms. Number of days in the past week that participants who were on blood pressure medications took their medications did not differ between the nurse referral ($n=22$) or telephone-assisted physician appointment referral ($n=27$) arm at follow-up (6.64 vs. 6.30, $p=0.51$).

Hypertension Knowledge. The increase in knowledge score (10% vs. 10%, $p=0.98$) between the two arms was not significantly different.

Hypertension Self-care. The increase in self-care score (0.10 vs. 0.05, $p=0.43$) between the two arms was not significantly different.

DISCUSSION

The Institute of Medicine supports the use of faith community nurses and lay health workers to improve care for disadvantaged groups.^{12,39,40} We found providing telephone assistance with making appointments with a primary care physician led to a greater reduction in systolic blood pressure for individuals with elevated blood pressure from a health fair than did direct referral to a faith community nurse.

Physician and Nurse Visits

Disadvantaged communities have large barriers in accessing care.⁴¹⁻⁴⁴ It may be that our telephone facilitation of visits with

Table 2. Main Outcomes According to Randomization Arm*

	Faith community nurse referral arm		Telephone-assisted physician appointment arm		P Value
	N	Mean (SD) or N (%)	N	Mean (SD) or N (%)	
Provider seen during study period					
Nurse only	41	6(15)	44	3(7)	0.24
Physician only	41	16(39)	44	26(59)	0.06
Nurse and physician	41	12(30)	44	9(20)	0.35
Did not see nurse or physician	41	7(17)	44	6(14)	0.66
Patient reported counseling received in provider visits ^a					
Dietary counseling					
By nurse	15	15(100)	11	7(64)	0.01
By physician	25	24(96)	32	23(72)	0.02
Physical activity counseling					
By nurse	15	15 (100)	11	7(64)	0.01
By physician	26	25(96)	32	23(72)	0.02
Counseling on how to take medication					
By nurse	12	8(67)	11	6(55)	0.55
By physician	25	23(92)	29	24(83)	0.31
Hypertension Outcomes					
mm Hg drop in systolic blood pressure	41	7(15)	43	14(15)	0.04
% received medication intensification	41	23(56)	44	27 (61)	0.62
% increase in knowledge score	41	10(27)	44	10(23)	0.98
Increase in self-care score	31	0.10(0.28)	32	0.05(0.23)	0.43

Plus-minus values are means \pm SD. Continuous variables were compared with the use of a two-sample t-test. Dichotomous variables were compared using chi-squared tests

*The term "nurse" refers to faith community nurse throughout the table

^aThe sample sizes vary in each row since not all patients who saw a nurse or physician answered the services provided questions in the follow-up questionnaire. Results are reported from the total number of responses provided. The term "nurse" refers to faith community nurse throughout the table

a physician was sufficient for our participants to overcome these barriers. Participants in both arms of our study had at least one visit with a physician during the study period, demonstrating the success rate of the faith community nurses and the study team in referring patients to physicians. This finding is important since faith community nurses can play a central role in facilitating physician visits.⁴⁵ The study team was able to facilitate these physician visits at a similar rate through telephone assistance, demonstrating the effectiveness of nonmedical personnel in assisting patients with physician appointments.

Additionally, health fairs may serve as an effective strategy in identifying persons with treatable chronic conditions. Health fairs provide an opportunity to access otherwise hard to reach populations in low-income, immigrant communities. The argument for the expansion of health fairs to detected hypertension may be strengthened by the importance of early detection and treatment to prevent the consequences of uncontrolled hypertension, especially in uninsured, minority populations.^{1,2,12,46} Considering that churches see the value in hosting health fairs, continuing and expanding health fairs may be one way to identify persons with elevated blood pressure in these communities.^{26,27,47,48}

Counseling

The participants in the faith community nurse referral arm were significantly more likely to report both dietary and physical activity counseling. These findings may suggest the important role of faith community nurses in counseling patients and their complementary role to physician services. Yet, we found no difference in improvement in self-care between the study arms, perhaps pointing to the impact of low-intensity counseling on lifestyle behaviors or too short of a study period to detect significant behavioral changes.⁴⁹⁻⁵¹

Hypertension Outcomes

Participants in the both study arms demonstrated improvements in systolic blood pressure, but those who had telephone assistance in making a physician appointment had a larger reduction in systolic blood pressure. We found no differences in medication intensification, medication adherence, or self-care across arms to explain our findings. There may have been real differences in adherence or self-care, but the study instruments may not have been responsive to a level of change that might explain the difference in systolic blood pressure during our study period. Although both arms had similar rates of medication intensification, patients in the telephone-assisted physician appointment arm may have had more adjustments made since the average time from recruitment to their first physician appointment was likely shorter than the average time for participants who were randomized to see the nurse. Since nurses cannot prescribe medications, our finding may point to the importance

prescribing antihypertensive medications in lowering systolic blood pressure.

LIMITATIONS

Our study has some limitations. Our findings may not be generalized to all populations since we recruited from health fairs, where attendees may be more activated to seek and receive healthcare. Some of the enrollees may have attended a health fair to get their blood pressures checked as part of an ongoing medical treatment program. We also could not mask the nurses to study participants due to the nature of the intervention. Self-report, particularly in relationships with power differentials, could be heavily influenced by social desirability bias; more participants could have reported attending a follow-up appointment than actually did. Also, blood pressure outcomes may reflect the counseling received instead of the referral process. Ideally, we would want to compare the content and delivery of counseling conducted by the nurses and the physicians. Unfortunately, we could not collect data from the multiple physicians who took care of the study participants, therefore we were unable to measure physician services delivered or verify if physician appointments were kept. We found that participants in the telephone-assisted physician appointment arm also visited the nurse. We did not explicitly direct the participants in that arm to avoid seeing a nurse. Since this is a small community, the participants may have heard about the nurse through other community members and visited her on their own. Also, a 4-month follow-up period may not have been enough time for behavioral changes to have an effect on outcomes.⁵²

CONCLUSION

We found that telephone-assisted physician appointments provided a significant decline in systolic blood pressure among low-income, immigrant attendees of health fairs. Participants in the telephone-assisted physician appointment arm had a greater reduction in systolic blood pressure than in the faith community nurse referral arm. This study underscores the need for collaborative evaluations of community based interventions and that evaluations can provide evidence-based improvements in allocation of community resources and offer solutions in mitigating health disparities.

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Conflict of interest: During the design phase and the implementation of this study, Alice Sorrell was the acting Director of QueensCare Health and Faith Partnership.

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