Social Determinants of Health as Potential Influencers of a Collaborative Care Intervention for Patients with Hypertension

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Objectives: The use of collaborative care teams, comprising nurse care managers and community health workers, has emerged as a promising strategy to tackle hypertension disparities by addressing patients' social determinants of health. We sought to identify which social determinants of health are associated with a patient's likelihood of engaging with collaborative care team members and with the nurse care manager's likelihood of enlisting community health workers (CHW) to provide additional support to patients.

Methods: We conducted a within-group longitudinal analysis of patients assigned to receive a collaborative care intervention in a pragmatic, cluster randomized trial that aims to reduce disparities in hypertension control (N=888). Generalized estimating equations were used to identify which social determinants of health, reported on the study's baseline survey, were associated with the odds of patients engaging with the collaborative care intervention, and of nurses deploying community health workers.

Results: Patients who were unable to work and those with higher health literacy were less likely to engage with the collaborative care team than those who were employed full time or had lower health literacy, respectively. Patients had a greater likelihood of being referred to a community health worker by their care manager if they reported higher health literacy, perceived stress, or food insecurity, while those reporting higher numeracy had lower odds of receiving a CHW referral.

Implications/Conclusions: A patient's social determinants of health influence the extent of engagement in a collaborative care intervention and nurse care manager appraisals of the need for supplementary support provided by community health workers. *Ethn Dis*. 2021;31(1):47-56; doi:10.18865/ed.31.1.47

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Introduction

Hypertension is the most common diagnosis in the United States and the single largest contributor to cardiovascular disease mortality rates.[1-3] The disproportionate distribution of hypertension prevalence and poor control observed among African Americans, Hispanics, and/or those residing in rural, medically underserved areas can be attributed to intersecting social, cultural, and economic factors.[4-7] These social determinants of health are shaped by the social and environmental contexts within which people live and work.[8,9] They are implicated in cardiovascular disease prevalence and mortality and are a fundamental root cause of intransigent disparities in hypertension incidence, prevalence, and control.[10]

A key strategy for mitigating the impact of social determinants of health on cardiovascular disparities is the development, implementation, and evaluation of individual- and population-level interventions.[10] Collaborative care delivery is a prime example of a successful approach to supporting medically and socially complex patients. The collaborative care model emerges from Katon and

colleagues' landmark study, a randomized controlled trial of patients with major depression that used nurse care managers (NCMs) to optimize multifaceted care coordination for patients whose multiple comorbid conditions had compatible management guidelines.[11] NCMs worked closely with primary care providers, and consulted with psychiatrists, to integrate medical and psychological disease management. This collaborative model of care delivery was characterized by NCM-directed development of individualized treatment plans, ongoing follow-up, and care coordination with other members of patients' care teams. Those in the intervention group experienced improved glycated hemoglobin levels, cholesterol levels, systolic blood pressure, and depression scores. They were also more likely to receive appropriate adjustments for insulin and antihypertensive and antidepressant medications. Patients also reported better quality of life and greater satisfaction with care for diabetes, coronary heart disease, and depression.[11]

Concomitant with the rise of the collaborative model of care delivery is the growing recognition of the need to incorporate community-based strategies that are patient-centered, culturally resonant, and focused on addressing social determinants of health within the health care setting.[12] Chief among these strategies is the inclusion of community health workers (CHWs) into care teams. CHWs are frontline public health personnel who share common attributes with, and/or have a nuanced understanding of, the communities they serve, linking members of underserved communities to health care and social services.[13-15] While NCMs, primary care providers, and specialist consultants comprise the core members of collaborative care teams, CHWs can extend the work of NCMs to tackle patients' social determinants of health.[16-19]

The inclusion of CHWs in collaborative care teams is a promising approach that may improve blood pressure control among members of disadvantaged communities.[14,15] It is possible, however, that the same social determinants of health that circumscribe self-management of blood pressure control may also hinder the extent to which members of vulnerable populations can participate in interventions geared toward their amelioration. Further, while we generally know that several of the tasks CHWs perform within multidisciplinary teams center on addressing patients' social determinants of health,[17-19] there is a need to elucidate how the use of structured protocols guiding NCMs on CHW deployment intersects with patients' social determinants of health, particularly, which specific determinants compel NCMs to enlist CHWs to provide additional resources to patients. Thus, the objective of this exploratory study was to identify which social determinants of health are associated with 1) patients' likelihood of engaging with a collaborative care intervention geared toward reducing hypertension disparities, and 2) nurse care managers' likelihood of enlisting CHWs to support patients.

Methods

Study Setting

The RICH LIFE Project (Reducing Inequities in Care of Hypertension: Lifestyle Improvements for Everyone) is a large, pragmatic cluster randomized trial that began in 2015 and is presently underway in 30 primary care clinics across Maryland and Pennsylvania.[20] Its principal goal is to compare the effectiveness of clinic-based standard of care practices, enhanced by audit, feedback, and education, with a clinic and community-based intervention utilizing a collaborative care team approach (CC/Stepped Care) to deliver contextualized, appropriately stepped care. Eligible patients are: aged ≥21 years, non-Hispanic Black, non-Hispanic White, or Hispanic; receive care at participating clinics; and have uncontrolled hypertension and at least one comorbidity, including diabetes, coronary heart disease, hyperlipidemia, depression, or tobacco smoking.

Once a patient, whose primary care home is at a collaborative care intervention practice, consents to participate in the study, the study staff coordinates with the patient and the practice's collaborative care team. The patient's participation in the intervention is initiated when the first intervention visit is scheduled; the first visit can also take place over the phone. The study received approval from the Johns Hopkins University School of Medicine institutional review board.

Collaborative Care Intervention

The collaborative care intervention is characterized by a NCM-led care team that includes a CHW and access to as-needed specialist consultation. NCMs follow structured protocols that guide determinations for escalating the level of support a patient receives. The decision to do so is largely shaped by infor-

mation collected about the patient during the first intervention visit, as well as ongoing monitoring of the patient throughout their tenure in the study. The first intervention visit includes the NCM and CHW when possible so that, in the event that the NCM deems it necessary to supplement their efforts through the CHW's support, the patient has some familiarity with the CHW.

During the first intervention visit, the NCM assesses the patient's physical and psychosocial health, daily functioning, and social circumstances. NCMs can refer a patient to receive help from a CHW immediately, 1 month into the patient's participation in the study, or at 3 months. The CHW referral can occur within 24 to 48 hours of the first study intervention visit if the patient has pressing circumstances requiring immediate attention (eg, food insecurity, domestic violence, and poor or unstable housing) or upon special request from the patient and/or their primary care provider.

The CHW referral can occur at 1 month if: 1) the patient is willing to work with the CHW; 2) the NCM determines that their services alone will not appropriately address the patient's concerns; and 3) the patient experiences ongoing struggles with immobility, housing, transportation, utilities, and/or poor social or caregiver support. The CHW referral can occur at 3 months if: 1) the patient is willing to work with a CHW and their blood pressure, or other conditions, remain uncontrolled; or, 2) they continue to experience barriers to care.

Finally, NCMs may enlist CHW assistance in conducting targeted outreach for patients with whom they have yet to reach. For example, if a NCM is unable to reach a patient after several attempts, they will work with the CHW to devise a plan for the CHW to do a home visit or meet the patient before or after their visits with providers. Once in contact with a patient, the CHW administers a comprehensive assessment of the patient's social determinants of health, connects the patient to community resources, and uses patient-centered communication to encourage adherence to self-management goals. Interactions between patient and the NCM and/or CHW could occur over multiple contacts after referral to the CHW. However, it is possible for a patient's only encounter with the CHW to be during the first intervention visit. This occurs if the NCM's ongoing appraisal of the patient's needs, ascertained in follow-up encounters, indicates that additional CHW-delivered services are unnecessary.

The clear delineation of the roles and responsibilities of each care team member is central to successful collaborative care delivery. Consequently, we held interprofessional trainings with NCMs and CHWs to foster peer-learning and provide an orientation to the study; didactic training about health disparities, health promotion, patient-centered communication, and effective care team communication; and strategies to initiate and sustain patient engagement and adherence to antihypertensive regimens. In addition, NCMs and CHWs jointly reviewed the protocols guiding intervention delivery for each care team member, as well as their respective patient assessment forms.

Measures

There were two sources of data for this analysis: the patient baseline survey which, to date, offers the most complete set of information about a patient's self-reported sociodemographic information and social determinants of health; and NCMs' intervention documentation activities. We used the social determinants of health framework to guide the identification of measures across 4 of the 6 domains articulated by Artiga and Hinton: economic stability, education, food, and community and social context.[21] This analysis did not include information about participants' neighborhoods and physical environments, or their experiences with the health care system, which are the other two domains Artiga and Hinton highlight.

Independent Variables: Social Determinants of Health

Economic Stability

We captured economic stability through income and employment status. Study participants were asked to provide their income range, which was subsequently categorized as <$5000 to $29,999, $30,000 to $69,999, and ≥$70,000. They indicated their type of employment through an item with 8 responses, including, for example, "working full time" or "keeping house or raising children full time."

Education

We assessed a patient's education through health literacy and numeracy, bearing in mind that, despite the strong correlation between health and numerical literacy and educational attainment, higher educated individu-

als may nonetheless have poor skills in these areas.[22,23] Health literacy was measured through the Brief Health Literacy Screen (BHLS-3), a 3-item measure using a 5-point Likert scale that assesses assistance needed with reading written materials from providers, confidence filling out forms, and difficulty understanding written information.[24] We used scoring processes endorsed by McNaughton and colleagues, such that each item was scored between 1 and 5, with higher scores indicating greater capacity, confidence, and comprehension performing reading tasks.[25] Numeracy, defined as the ability to access, comprehend, and apply numerical data to health-related decisions,[23,26] was evaluated through the 3-item version of the Subjective Numeracy Scale (SNS-3).[27] Its first two items capture self-reported ratings of numeracy skills, while the last item measures the perceived usefulness of numerical information. Respondents rate their skill on a scale of 1 to 6. The summative score ranges from 3 to 18; higher scores reflect greater facility and comfort with numerical concepts.[27]

Food

We evaluated access to food through a single item measuring food insecurity, which asked participants whether or not, over the last 12 months, they or a member of their household cut the size of their meals or skipped meals, because there was not enough money for food.

Community and Social Context

Dimensions of community and social context were captured through measures of stress, emotional support, and instrumental support. Stress was assessed through the Perceived Stress Scale (PSS-4), a 4-item global measure of stress eliciting 5-point Likert scaled responses to dimensions of stress experienced in the last month. Half of the items are reverse coded, with the scores of each item summed up to produce the final measure.[28] We used the Patient-Reported Outcomes Measurement Information System (PROMIS) Global sub-scales of Social Functioning to evaluate 2 key facets of social support: emotional support and instrumental support. Emotional support assesses an individual's perceived confidence in relationships and feeling cared for and valued, while instrumental support captures the extent to which the respondent perceives that assistance with material items, or cognitive or task performance, is available to them. Both of these measures use a 5- point Likert scale whose responses range from "never" to "always."[29] These measures are T-scores derived from probability-based analyses that used 2010 US Census data to ascertain national norms related to PROMIS items. A T-score of 50 represents the mean of the US general population, and 10 T-score units constitutes 1 standard deviation.[30-32]

Dependent Variables: Care Team Engagement and CHW Deployment

Our dependent variables originated from NCM documentation of their implementation activities. We measured care team engagement through a dichotomous variable (yes/no) indicating if the patient engaged with a NCM or a CHW during the study. Patients who had at least 1 face-to-face or phone-based interaction with either a NCM or a CHW at any point in the study, including the first intervention visit with the collaborative care team, were considered engaged. Correspondingly, patients who did not meet with or speak to a NCM or CHW were categorized as not engaged. CHW deployment was similarly measured through a dichotomous measure to denote whether or not the NCM stepped a patient up to receive CHW-delivered interventions at any point during the patient's participation in the study.

Statistical Analysis

We summarized baseline characteristics using means and standard deviations (SDs) for continuous data and counts and percentages for categorical data. We also employed generalized estimating equations to adjust for intra-cluster correlation among patients served by the same NCM-CHW care team. Participants' baseline measures and the NCMs' implementation data were managed in a REDCap database and consolidated into a data set that was exported into Stata 11.1 (Stata Corp, College Station, TX) for statistical analysis. All tests were two-sided, with statistical significance set at P<.05.

Results

Patients' Baseline Characteristics

Table 1 summarizes the baseline characteristics of the participants receiving care at collaborative care intervention practices. The study population was predominantly female and non-Hispanic Black, with an average age of 60 years and a level of educa-

tional attainment roughly equivalent to high school education. A substantial proportion (approximately 66%) were married or had been married (widowed, divorced, or separated). While 40% of the study population reported earnings of $30,000 or more per year in income, a considerable segment (about 32%) earned less than $30,000. The majority of participants were not working, due to being retired, unemployed, or unable to work due to health issues, but 38% reported working at least part-time. The mean BHLS-3 (health literacy) score was 13.2, indicating a predominance of adequate to relatively high health literacy within the study population. The mean SNS-3 (subjective numeracy) score of 13.6 suggests moderate levels of numeracy, given the scale's maximum score of 18. Approximately 18% of the study population reported experiencing food insecurity over the last 12 months. The mean scores for emotional and social support were slightly above the estimated national average. Of the 888 participants, 769 (86.5%) had an interaction with either a NCM or a CHW, and among the 769 participants who engaged with the collaborative care team, 267 (35%) received additional support from a CHW (data not shown).

Table 1. Demographic characteristics and social determinants of health among patients in the collaborative care intervention arm, N=888[a]

Demographic characteristics	
Age, mean years (SD)	59.9 (11.6)
Education, mean years (SD)	11.7 (2.4)
Sex, n (%)	
Male	346 (39.0)
Female	542 (61.0)
Race/ethnicity, n (%) [b]	
Hispanic/Latinx	43 (4.8)
Non-Hispanic White	271 (30.5)
Non-Hispanic Black	574 (64.6)
Marital Status, n (%)	
Married	348 (39.0)
Widowed	98 (11.0)
Divorced	139 (15.7)
Separated	55 (6.2)
Never married	203 (22.9)
Living with partner	44 (5.0)
Social determinants of health	
Income, n (%)	
<$30,000	280 (31.5)
$30,000 - $69,999	171 (19.3)
≥$70,000	188 (21.2)
Don't know/refused	249 (28.0)
Employment status, n (%)	
Working full time	249 (27.9)
Working part time	92 (10.3)
Retired	267 (29.9)
Unable to work due to health reasons	193 (21.6)
Unemployed or laid off	42 (4.7)
Looking for work	23 (2.6)
Homemaker or raising children full-time	21 (2.3)
Student	3 (.3)
Don't know/refused	3 (.3)
Health literacy, mean score (SD)	13.2 (2.7)
Subjective numeracy, mean score (SD)	13.6 (3.9)
Food Insecurity, n (%) [c]	
Yes	124 (17.5)
No	584 (82.5)
Perceived stress, mean score (SD)	4.1 (3.5)
PROMIS social functioning: emotional support, mean score (SD)	55.6 (8.6)
PROMIS social functioning: instrumental support, mean score (SD)	56.4 (9.5)

a. This sample size reflects the total number of patient participants. The actual sample size is lower for certain characteristics due to patient non-response or missing data.
b. In this study, participants' race/ethnicity came from their electronic medical records and was categorized as Black or African American, White, or Hispanic/Latino.
c. In response to the question, "Over the last 12 months, did you or your household ever cut the size of your meals or skip meals because there wasn't enough money for food?"

Patients' Social Determinants of Health and their Relation to Care Management Engagement and CHW Referrals

Table 2 displays the associations between patients' social determinants of health and their subsequent engagement with any member of the collaborative care team. After adjusting for age, race/ethnicity, marital status, sex, and years of education, we observed that the only social determinant of health related to engagement with the care team was economic stability. Specifically, those who were unable to work due to health reasons were less likely to engage with a member of the collaborative care

team, compared with their counterparts who were employed full-time.

Table 3 contains results evaluating associations between patients' social determinants of health and their likelihood of receiving CHW-delivered interventions. We adjusted for age, race/ethnicity, marital status, sex, and years of education and found that patients who earned ≥$30,000 were significantly less likely to be referred to a CHW, compared with those earning <$30,000. This suggests that poverty was associated with a greater likelihood of CHW deployment on the part of NCMs. Health literacy and numeracy were also associated with receipt of CHW services: NCMs were less likely to refer patients displaying higher health literacy and numeracy, evidenced by reduced odds of CHW referral as their health literacy and numeracy scores increased. Patients who reported experiencing food insecurity in the past 12 months were nearly 2.6 times as likely of receiving support from a CHW relative to those without food insecurity. Finally, patients who reported greater subjective perceptions of stress at baseline had higher odds of being referred to a CHW.

Discussion

In this analysis, we sought to explore how social determinants of health shape a patient's engagement with the collaborative care team and their role in the NCM's deployment of CHWs. To our knowledge, this is the first study attempting to examine this in the context of collaborative care delivery and receipt. We observed that being unemployed due to health reasons was negatively associated with patient engagement with the collaborative care intervention. We also found that patients who reported earning an annual income of ≥$30,000 were less likely to be referred to a CHW. Those with higher levels of health literacy and numeracy were also less likely to be referred to a CHW. In contrast, NCMs were more likely to enlist CHWs to proffer assistance to patients reporting food insecurity and greater self-reported stress.

The implications of our findings can be viewed through the lens of intervention fidelity, defined in seminal work conceptualized by Carroll and colleagues as the degree to which an intervention or program is delivered as intended by its developers.[33] Carroll et al describe intervention fidelity as comprising 5 interlocking elements: adherence to an intervention; exposure or dose; quality of delivery; participant responsiveness; and program differentiation. Intervention adherence, quality of intervention delivery,

Table 2. Association of patients' social determinants of health and likelihood of patient engagement with collaborative care team, N=769 [a]

SDOH Category	SDOH Characteristic	Engagement with CC Team	
		AOR (95% CI)[b]	P
Economic stability	Income		
	<$30,000	(reference)	—
	$30,000 - $69,999	.69 (.34, 1.36)	.28
	≥$70,000	1.35 (.60, 3.04)	.47
	Employment [c]		
	Working full time	(reference)	—
	Working part time	1.27 (.50, 3.21)	.62
	Retired	2.66 (.83, 8.46)	.10
	Unable to work due to health reasons	.37 (.14, .94)	.04
	Unemployed or laid off	3.02 (.71, 12.77)	.13
Education	Health literacy	.96 (.90, 1.02)	.18
	Numeracy	1.01 (.95, 1.07)	.78
Food	Food insecurity	1.17 (.68, 1.99)	.57
Community and social context	Perceived stress	.98 (.93, 1.04)	.60
	Emotional support	1.00 (.97, 1.02)	.95
	Instrumental support	1.00 (.98, 1.02)	.65

SDOH, social determinants of health; CC, collaborative care.
a. This sample size reflects the number of observations included in most of the multivariable analyses (within 1%).
b. Adjusted for age, race/ethnicity, sex, marital status, and years of education, as well as clustering within collaborative care teams.
c. Responses with n<40 within categories not reported.

Table 3. Association of patients' social determinants of health and likelihood of CHW step-up, N=769 [a]

SDOH Category	SDOH Characteristic	CHW Step-up (Yes/No)	
		AOR (95% CI) [b]	P
Economic stability	Income		
	<$30,000	(reference)	—
	$30,000 - $69,999	.39 (.22, .69)	.001
	≥$70,000	.18 (.10, .32)	<.001
	Employment [c]		
	Working full time	(reference)	—
	Working part time	1.33 (.60, 2.97)	.49
	Retired	1.53 (.64, 3.68)	.34
	Unable to work due to health reasons	2.34 (.76, 7.17)	.14
	Unemployed or laid off	2.17 (.26, 18.06)	.47
Education	Health literacy	.88 (.83, .93)	<.001
	Numeracy	.93 (.89, .98)	.01
Food	Food insecurity	2.59 (1.68, 3.99)	<.001
Community and social context	Perceived stress	1.06 (1.02, 1.11)	.01
	Emotional support	.98 (.96, 1.00)	.10
	Instrumental support	.99 (.97, 1.00)	.10

SDOH, social determinants of health; CHW, community health worker.
a. This sample size reflects the number of observations included in most of the multivariable analyses (within 1%).
b. Adjusted for age, race, gender, marital status, and years of education, as well as clustering within collaborative care teams.
c. Responses with n<40 within categories not reported.

and participant responsiveness are the facets of intervention fidelity that are the most relevant to this study's results. NCMs' adherence to the protocol is evidenced by the social determinants of health found to be associated with an increased likelihood of CHW referrals. Food insecurity, poverty, and stress were explicitly endorsed as suitable criteria for CHW deployment.

Our results also allude to the quality of intervention delivery, a concept underpinned by subjective and objective judgments of the manner in which an interventionist delivers an intervention. This is an important consideration in view of adaptations of the protocol NCMs made to account for patients' lived experiences. The protocols did not specify low levels of health or numerical literacy as grounds for CHW referrals. Furthermore, neither the NCMs nor the CHWs had access to patients' baseline survey data at any point of their involvement in the study. NCMs' ability to discern when a patient requires additional support indicates a nuanced understanding of study participants' needs, including less conspicuous barriers to care. It may also hint at the perceived utility ascribed to CHWs in addressing social determinants of health and a general clinical gestalt based on an understanding of the interconnectedness between social determinants of health and their resultant cascading effects on overall health and well-being. For instance, the independent associations between health and numerical literacy, and chronic disease management and control, are well-established.[34] It is possible that participants with low levels of literacy may have been experiencing greater challenges with managing their hypertension, triggering the need for CHW referral.

Finally, these results provide some indication that social determinants of health may only partially explain facets of participant responsiveness, which is an indicator of how much participants are engaged by an intervention.[33] Despite being assigned to the collaborative care intervention, some patients had not engaged with the care team due to a lack of interest, difficulties aligning their schedules to meet with the NCM and CHW, or other unknown personal circumstances. All of these factors highlight the possibility that engagement with the collaborative care team may actually be influenced by patients' latent attitudes, beliefs, and perceptions of the salience of the collaborative care intervention.

The only social determinant of health that emerged as being associated with a reduced likelihood of engaging with the care team was employment, specifically, inability to work due to health reasons. To ac-

count for the possibility that inability to work due to health reasons may be a proxy for comorbidities, we conducted additional analyses controlling for coronary heart disease, type 2 diabetes, hyperlipidemia, smoking, and depression, individually and through a measure capturing disease burden. The association between inability to work due to sickness/health and engagement with the care team persisted, even after controlling for the aforementioned conditions. While inability to work due to health reasons may be linked to broader immobility or transportation issues that could hinder a patient's ability to meet with the NCM and/or CHW in person, patients did have the option of connecting to their collaborative care team over the phone. Thus, the reduced likelihood of any form of engagement may portend other intersecting psychosocial factors that require further examination.

Our findings also introduce new questions about how a patient's intrapersonal factors, such as knowledge about the specific roles assumed by care team members, confidence in care team members' abilities in assisting them, judgments of care manager's and community health worker's trustworthiness with respect to handling sensitive personal information, and their beliefs about their ability to successfully manage their hypertension, may shape a patient's willingness and capacity to engage with members of collaborative care teams. These factors may be shaped by the realities of having competing priorities with lower resources, which may reduce a patient's bandwidth to engage in an intervention that they might not fully understand.

Study Limitations

There are some important limitations to this study. Our measures of social determinants of health were limited by the participant's self-reported information from the baseline survey, which did not include other important socioeconomic considerations, such as the quality or security of housing or consistent access to a phone and/or transportation, which may be associated with a patient's engagement with the intervention. Further, our analyses were based on social determinants of health assessed at baseline. While this work sheds light on which ones were predictive of overall engagement in the care team and NCMs' likelihood of soliciting assistance from CHWs, it does not capture the realities of the shifting nature of a patient's social determinants of health, including: the contexts under which they were addressed; the extent to which the mitigation or reemergence of social determinants of health was associated with a patient's engagement with the care team; the NCM's likelihood of initiating CHW referral; or which social determinants of health were related to the need for targeted outreach from the CHW after the NCM failed to reach them. We are in the final stages of assembling NCM and CHW intervention documentation, which is the source of this critical information and will elucidate these matters in future explorations. This includes examining the potential dose-response relationship between engagement with members of the care team and a patient's cardiovascular and self-reported quality of care outcomes.

The majority of study participants had health insurance, received care in primary care settings, and were female, African American, and had an average of 12 years of education; therefore, these results may only be generalizable to populations who share similar characteristics.

Nonetheless, this study possesses several strengths. Our focus on a population with significant disparities in cardiovascular health makes an important contribution to the literature examining the factors influencing successful implementation and effectiveness of a unique collaborative care team intervention. Results from this study affirm the need for further exploration into the cascade of decisions undertaken by a NCM to enlist supplementary support from a CHW, and to examine perceived roles and responsibilities of collaborative care team members in addressing social determinants of health. They also suggest a need to discern how a patient's intrapersonal qualities and behaviors affect their engagement with collaborative care team members. Such inquiry has the potential to optimize interventions targeted toward improving the health and well-being of vulnerable populations.

Conclusions/ Implications

The use of collaborative care teams featuring NCMs and CHWs is an emerging approach to tackling disparities in hypertension control, as each member of the team attends to the convergence of physical, psychosocial, and structural factors affecting disadvantaged communities. Our study suggests that social determinants of health influence collaborative care engagement and delivery.

Our approach harnesses concepts of implementation science – particularly, dimensions of intervention fidelity – and health disparities and health equity research, to illuminate the complex interplay between a patient's social determinants of health, cardiovascular disease management, and factors influencing the degree to which members of vulnerable communities engage with and receive interventions that may reduce cardiovascular disparities. At the same time, further work is needed to understand a patient's intrapersonal characteristics as they relate to collaborative care team engagement, NCM appraisals of patient needs, and the care team members regarded as best suited to fulfill them.

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Contributors

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Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Ibe, Alvarez, Marsteller, Bone, Cooper; Acquisition of data: Carson, Marsteller, Greer, Cooper; Data analysis and interpretation: Ibe, Alvarez, Carson, Marsteller, Crews, Greer, Cooper; Manuscript draft: Ibe, Carson, Crews, Dietz, Bone, Statistical expertise: Ibe, Carson; Acquisition of funding: Marsteller, Cooper; Administrative: Ibe, Alvarez, Crews, Dietz, Greer, Bone, Cooper; Supervision: Marsteller, Bone, Cooper

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