ORIGINAL RESEARCH

Interdisciplinary Primary Care Team Expertise and Diabetes Care Management

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Background: **Interdisciplinary primary care team expertise can aid patient self management of type 2 diabetes, but small community health centers (CHCs) may not have the volume to consistently provide interprofessional care. We examine whether care team role expertise is associated with patients' experiences of chronic care and whether the relationship is stronger for small CHC sites.**

Methods: **Surveys of 1277 adults with diabetes (2012; response rate = 47%) that assessed nonphysician team roles involved in managing their chronic care, including community health workers, diabetes educators, nutritionists, pharmacists, mental health providers, and other general staff, were integrated with clinical and administrative data from 14 CHCs. Random effects regression models estimated the association of team expertise, CHC size, and 1) patients' experiences of chronic care; and 2) hemoglobin A1c control, controlling for patient comorbidities, sex, race/ethnicity/primary language, age, and insurance coverage.**

Results: **Care teams with community health workers ($\beta = 7.67$, $P < .01$), diabetes educators ($\beta = 6.05$, $P < .01$), nutritionists ($\beta = 5.21$, $P < .01$), and other general staff ($\beta = 4.96$, $P = .02$) were associated with better patients' experiences of chronic care, but not hemoglobin A1c control. Patients of small CHC sites reported better experiences of care ($\beta = 2.15$, $P = .03$) with each additional team role reported, but the relationship was not significant for large CHCs.**

Conclusions: **Patients with access to care team expertise in self-management support, including diabetes educators, nutritionists, community health workers, and other general staff report better experiences of chronic care. These team roles may reduce barriers to patient self management and improve patients' overall experiences of chronic care, particularly in small CHC sites. (J Am Board Fam Med 2021;34:151–161.)**

Keywords: **Community Health Centers, Community Health Workers, Minority Health, Patient Care Team, Primary Health Care, Self-Management, Type 2 Diabetes Mellitus**

Introduction

Adult patients with type 2 diabetes and other chronic conditions need support to improve their self-management skills, particularly socioeconomically vulnerable populations that face more social and nonmedical barriers to diabetes control.[1–3] The availability of broad, interdisciplinary expertise on primary care teams may improve patient self management by providing different skills in overcoming barriers to self management. Previous research among commercially insured patients indicates that access to nurse practitioner, nurse, and nutritionist expertise on care teams is associated with better self management of diabetes,[4] but it remains unclear whether the benefits of broader team expertise extend to socioeconomically vulnerable patients receiving care in community health centers (CHCs). The unique organizational context of CHCs, including high turnover and financial instability,[5–7] may affect patient access to and experience with interdisciplinary care teams.

CHCs are safety net health care organizations with a mission to provide outpatient care to underserved and socioeconomically disadvantaged communities. CHCs have long faced staff shortages, with large vacancies in physicians and registered

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nurses.[7] Effective interdisciplinary primary care teams are essential for CHCs because high primary care clinician (PCC) turnover has led many CHCs to assign patients to care teams or sites rather than individual PCCs.[8] Care team assignment may be less than optimal for fostering PCC-patient relationships because continuous relationships with individual PCCs promotes patient trust and treatment adherence,[9–11] while care team approaches can be implemented in ways that are not patient-centered.[11,12]

Organizational facilitators of effective care teams may vary depending on CHC size. Higher-volume facilities may have greater slack resources to hire staff and sufficient health information technology to coordinate patient care compared with smaller volume facilities. However, small CHC sites have the benefit of fostering interpersonal relationships through small size,[13] and can use interorganizational partnerships to share personnel and resources including data analysts, care coordinators, and nutritionists.[14] Previous research has demonstrated smaller primary care practices have better access to care and fewer potentially preventable hospital admissions than large primary care practices.[15,16] If care teams of small CHC sites are more effective in coordinating care because of their relationships, interdisciplinary expertise may improve patient self management and glycated hemoglobin (HbA1c) control, rather than result in process losses due to coordination problems.

We examine the extent to which the availability of interdisciplinary expertise on primary care teams is associated with better diabetic patients' experiences of chronic care and HbA1c control. To examine whether interdisciplinary expertise differs by practice size, we assess whether the relationship between expertise and patient outcomes differ in small versus large CHC sites. Previous studies have separately found that the expertise of individual care team members[17–26] and overall team expertise[4] contribute to effective chronic care management. We build on previous research by including community health workers (CHWs) and diabetes educators as expertise sources central to care management in CHCs, as well as disentangling the effect of specific team expertise from the overall expertise on the primary care team.

Methods

This study analyzes cross-sectional data collected as part of a cluster-randomized trial of 14 CHC sites in California.[27] Patients were sampled in 2011 and the survey was fielded in 2012 (response rate = 47%). The survey was mailed to a random sample of patients who were least 18 years old, had at least 2 visits to a participating CHC site, and had a type 2 diabetes diagnosis code or prescription per the SUPREME-DM definition.[28] A 2-visit criterion was used to assess the perspectives of established patients of the CHCs. The survey was fielded in English, Spanish, and Chinese, and included a $10 gift card. Nonrespondents were contacted by phone for up to 8 attempts, patients were given the option to consent and complete the survey over phone. From 1396 total respondents, 119 patients (8.5%) were excluded due to incomplete survey responses, resulting in an analytic sample of 1277 patient surveys, which were linked with 2011 to 2012 clinical and administrative data.

Outcome Variables

The 2 study outcomes are 1) patients' experiences of chronic care, and 2) HbA1c control. Patients' experiences of chronic care were assessed using a diabetes-specific adaptation of the Patient Assessment of Chronic Illness Care (PACIC-11).[29,30] Questions included: "Over the past 6 months, when I received care for my diabetes at this clinic, how often was I: given choices about treatments to think about; helped to set specific goals to improve my eating or exercise; and helped to plan ahead so I could take care of my condition even in hard times." Response categories included "never," "sometimes," "usually," and "always." To generate a composite, responses to PACIC-11 questions were scored as a continuous measure (range, 0 to 100; internal consistency reliability, $\alpha = 0.91$). Following the half-scale rule, a composite score was only calculated for patients with at least half of the questions completed.[31]

We measured HbA1c through a dichotomous measure coded as 1 for acceptable control (HbA1c result $< 8.0\%$) versus 0 for poor control.[32] This is consistent with the American Diabetes Association's guideline as a reasonable HbA1c goal for patients with comorbid conditions.[33]

Independent Variables

Our main independent variables are 1) access to specific team expertise, and 2) an overall count of interdisciplinary expertise on the primary care team. Access to team expertise was assessed using patient reports of CHC clinicians and staff endorsed as "help[ing] you with your diabetes,"

including community health workers, diabetes educators, nutritionists, pharmacists, mental health providers, and other general staff. Overall care team expertise is a count of the number of team expertise sources reported, ranging from 0 (none) to 6. Both expertise measures are measured at the patient level given that patients have different constellations of clinicians involved in their diabetes care based on their needs and preferences.

CHC site size was examined as a moderator of the team expertise and diabetes care management relationship and was measured by the annual (2012) unique adults with diabetes the site served. CHC sites served a range from 118 to 1609 adult patients with diabetes. Sites were classified as large (n = 6) if they cared for 250 or more adults with diabetes or small (n = 8) if they cared for fewer than 250 adults with diabetes.

Patient sex, age, insurance, and comorbidity information was sourced from administrative and clinical data. Race, ethnicity, primary language information, and how long the patient was established with the CHC site (< 3 years, 3 to 5 years, 5+ years) were collected in the patient survey. We constructed a combined categorical variable for race, ethnicity, and language given their correlation in the patient responses:[34] Asian patients speaking Chinese (n = 578), Asian patients speaking English (n = 116), Latino patients speaking Spanish (n = 132), Latino patients speaking English (n = 166), and English-speaking patients of other racial/ethnic background (n = 404), including Black and non-Latino White patients.

Statistical Analysis

Descriptive statistics compare patient characteristics and predictor variables in small versus large CHC sites; t-tests were used for continuous variables and Chi-square tests for categorical variables. Multivariable logistic regression estimated the association of patient access to specific team expertise, overall care team expertise, and CHC site size (small vs large) on HbA1c control (< 8.0%). To examine whether patients of small CHC sites benefit more from expertise, we tested an interaction between site size and overall interdisciplinary expertise. Then, multivariable linear regression models estimated the association of patient access to specific team expertise, overall care team expertise, and CHC site size (small vs large) on patients' experiences of chronic care (PACIC-11). An interaction between site size and overall interdisciplinary expertise was included to assess whether patients of small CHC sites benefit more from expertise. Models included random CHC site effects to account for the clustering of patients within CHC sites, and control for patient age, sex, race/ethnicity/language, insurance source, and comorbidities.

We used Little's test to assess covariate-dependent missingness,[35] then multiple imputation was conducted for missing values. We computed the Variance Inflation Factor (VIF) for all independent variables and used a cutoff of VIF ≥ 2 to assess potential collinearity. To examine the robustness of the HbA1c result, we estimated a logistic regression with an HbA1c cut point of ≤ 9.0% designated as acceptable control, as well as a linear regression model using a continuous measure of HbA1c. More clinically complex patients may have greater need for team expertise. To assess the sensitivity of our findings to potential selection effects, inverse probability of treatment weights (IPTWs) were used for each patient. IPTWs were calculated equal to the inverse of the probability of having access to any non-PCC expertise, conditional on control variables. All statistical analyses were completed using STATA 16.0 (StataCorp, College Station, TX) by the authors and approved by the Institutional Review Board of the University of California–Berkeley.

Results

Distribution of patient characteristics are comparable in small and large CHC sites, except for patient sex ($P < .05$) and race/ethnicity/language ($P < .001$) (Table 1). Small CHC sites had a lower percentage of female patients compared with large CHC sites (overall: 57.6%, small sites: 54.1%, large sites: 59.8%). The most common category of race/ethnicity/language are Chinese-speaking Asian patients (overall: 40.3%, small sites: 30.4%, large sites: 47.5%), followed by Spanish-speaking Latino patients (overall: 29.4%, small sites: 38.8%, large sites: 23.6%), English-speaking Latino patients (overall: 12.5%, small sites: 13.8%, large sites: 11.6%), English-speaking patients of other racial/ethnic backgrounds (overall: 9.5%, small sites: 7.6%, large sites: 10.6%), and English-Speaking Asian patients (overall: 8.5%, small sites: 9.3%, large sites: 7.9%). Mean number of comorbid conditions is 2.99 (standard error = 1.9) and more than half of patients are between 46 and 65 years old

Table 1. Adult Diabetic Patient Characteristics for the Overall Sample and Compared between Small and Large Community Health Center (CHC) Sites, 2011-2012

Variable *Percentage of Population, Mean (Standard Error)*	Overall	Small CHC Site	Large CHC Site	*P*-Value
Female	57.6%	54.1%	59.8%	.048*
Age (years old)				.36
26 to 35	3.0%	2.1%	3.5%	
36 to 45	10.1%	11.8%	9.1%	
46 to 55	23.8%	22.9%	24.3%	
56 to 65	35.5%	36.4%	34.9%	
66 to 75	19.3%	19.4%	19.3%	
76+	8.3%	7.4%	8.8%	
Race/ethnicity/language				< .01*
Chinese-speaking Asian	40.3%	30.4%	46.3%	
English-speaking Asian	8.5%	9.3%	7.9%	
English-speaking Latino	12.5%	13.8%	11.6%	
Spanish-speaking Latino	29.4%	38.8%	23.6%	
English-speaking other	9.5%	7.6%	10.6%	
Insurance source				.20
Medicaid	33.0%	36.9%	30.7%	
Medicare	5.4%	6.0%	5.0%	
Other	2.8%	2.8%	2.8%	
Private	27.9%	26.0%	29.0%	
Uninsured	31.0%	28.3%	32.5%	
Total comorbidities	2.9 (1.9)	3.0 (1.9)	2.9 (1.9)	.56
How long usual clinic				.18
< 3 years	32.5%	32.4%	32.5%	
3 to 5 years	28.7%	31.4%	27.0%	
5+ years	38.9%	36.2%	40.5%	
Observations	1277	484	793	

This comparison of means analyses utilizes χ^2 tests for categorical variables and *t*-test for continuous variables to compare patient characteristics in small versus large community health center sites.
**P*-values represent the significance of differences in individual characteristics between small versus large sites.

(58.3%). Medicaid is the most common insurance coverage (33.0%), followed by uninsured (31.0%), private insurance (27.9%), and Medicare (5.4%).

Interdisciplinary team expertise was similar for both small and large CHC sites (Table 2). The mean number of specific team members available beyond primary care physicians and nurses reported by patients was 0.81 (standard error = 1.31) and this did not differ for small and large CHC sites. Roughly 1 out of 5 patients in both small and large CHC sites report access to the expertise of nutritionists, diabetes educators, pharmacists, and other general staff. There was no significant difference between small and large CHC sites in patient access to specific team expertise except for other general staff, where patients of small CHC sites were more likely to report access to other general staff in their diabetes care ($P = .01$). Nutritionists were the most common care team member available to patients (overall: 28.4%, small sites: 27.3%, large sites: 29.2%), followed by general staff (overall: 22.3%, small sites: 25.8%, large sites: 20.1%), diabetes educators (overall: 19.3%, small sites: 19.9%, large sites: 19.0%), pharmacists (overall: 18.2%, small sites: 19.0%, large sites: 17.7%), community health workers (CHWs) (overall: 10.7%, small sites: 11.1%, large sites: 10.5%), and mental health providers (overall: 4.9%, small sites: 4.2%, large sites: 5.4%). Patients of small CHC sites reported higher PACIC-11 scores (overall: 51.3, small sites: 53.5, large sites: 49.9, $P = .02$). Three out of 4 patients (75.0%) had HbA1c under control and this did not differ between small and large CHC sites (small sites: 75.8% vs large sites: 74.6%).

Table 2. Descriptive Statistics for Care Team Expertise, Hemoglobin A1c Control, and Patients' Experiences of Chronic Care (PACIC-11) in the Overall Sample and Compared between Small and Large Community Health Center (CHC) Sites, 2011 to 2012

Variable *Percentage of Population, Mean (Standard Error)*	Overall	Small CHC Site	Large CHC Site	*P*-Value
Overall team expertise, count	0.88 (1.34)	0.88 (1.39)	0.87 (1.31)	.94
Interdisciplinary expertise on the primary care team, %				
Community health worker	11.7%	12.2%	11.3%	.65
Diabetes educator	21.0%	22.1%	20.3%	.44
Nutritionist	30.9%	30.4%	31.1%	.77
Pharmacist	19.8%	21.1%	19.0%	.38
Mental health provider	5.2%	4.5%	5.7%	.38
Other staff	24.3%	28.7%	21.6%	.01*
Hemoglobin A1c control (<8.0%)	75.0%	75.8%	74.6%	.99
Patients' experiences of chronic care (PACIC-11)	51.27	53.53	49.90	.02*
Observations	1277	484	793	

This comparison of means analyses utilizes χ^2 tests for categorical variables and *t*-test for continuous variables to compare average values of main predictor variables for patients in small versus large community health center sites.
**P*-values represent the significance of differences in individual characteristics between small versus large CHC sites.

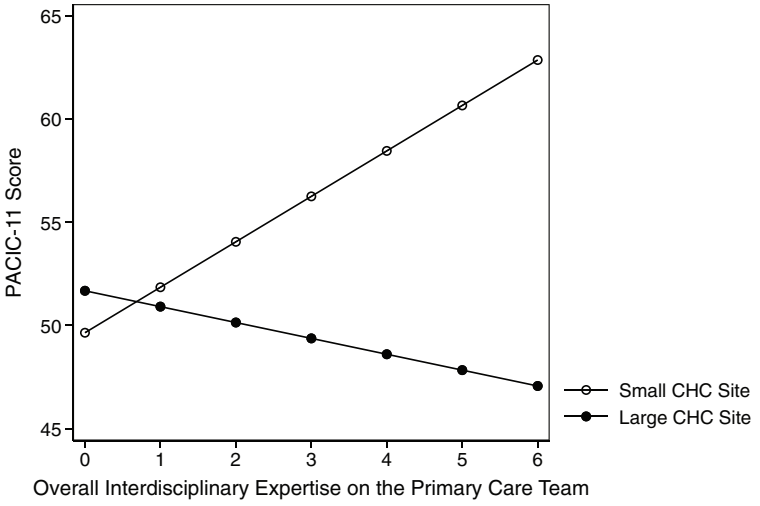
In adjusted analyses, patients with access to CHWs ($\beta = 7.67$, $P \leq .01$), diabetes educators ($\beta = 6.05$, $P \leq .01$), nutritionists ($\beta = 5.21$, $P \leq .01$), and other general staff ($\beta = 4.96$, $P = .02$) had significantly higher PACIC-11 scores compared with patients without access to their expertise. Patients of small CHC sites who had broader overall team expertise reported better experiences of chronic care ($\beta = 2.15$, $P = .03$), but this relationship did not hold for patients of large CHC sites. The interaction between large CHC site size and broader care team expertise range is statistically significant, where patients of large CHC sites with broader team expertise had lower PACIC-11 scores ($\beta = -2.58$, $P = .01$) (Figure 1). These PACIC-11 findings are consistent in a regression model that included IPTW to account for potential selection effects, except for the association of access to CHWs and general staff with higher PACIC-11 scores, which attenuated.

Overall interdisciplinary expertise on the primary care team, access to specific team expertise, CHC site size, and the interaction of overall access and CHC site size were not associated with odds of HbA1c control (< 8.0%) in adjusted analyses (Table 3). Chinese-speaking Asian patients (Odds Ratio [OR] = 2.20, $P < .01$) and English-speaking patients of other racial/ethnic backgrounds (OR = 2.22, $P = .01$) had significantly higher odds of HbA1c control than Spanish-speaking Latino patients. Patients between the ages of 36 and 45 years (OR = 0.43, $P < .01$) and 46 to 55 years old (OR = 0.58, $P < .01$) had significantly lower odds of HbA1c control compared with patients 56 to 65 years old. Estimating a logistic model with a control cut point of HbA1c ≤9.0% produced similar results, with minor deviations in coefficients and statistical significance levels for control variables (race/ethnicity/language and age), potentially due to different statistical power with less patients with glycemic control compared with the ≤8.0% HbA1c cut point. Sensitivity analyses that estimated a linear regression model for a continuous specification of the HbA1c outcome and included IPTW to account for potential selection effects produced consistent results with the logistic regression and unweighted regression model specifications.

Discussion

Our findings indicate that patient access to specific interdisciplinary care team expertise is associated with better experiences of chronic care for adult CHC patients with diabetes. Namely, patient access to CHWs, diabetes educators, nutritionists, and other general staff for diabetes care is associated with higher PACIC-11 scores. Interdisciplinary care team expertise, including CHWs and diabetes educators, have unique skills and experiences that

Figure 1. Association of community health center (CHC) size and interdisciplinary care team expertise with patient assessment of chronic care, 2011 to 2012. Margin plots depict adjusted score for Patient Assessment of Chronic Illness Care (PACIC-11). Overall interdisciplinary primary care team expertise includes community health workers, diabetes educators, nutritionists, pharmacists, mental health providers, and other general staff. Small CHC sites have less than 250 adult patients with diabetes compared with large community health center sites with 250 or more adult patients with diabetes.



can aid diabetes self management for socioeconomically vulnerable patients, and our results provide evidence of their benefit in the patient experience. The benefit of empowering medical assistants to take more responsibility for patient care has been demonstrated in high-performing safety net clinics.[36] Diabetes educators and nutritionists are also well positioned to provide self-management support that can advance patient-centered chronic care.[37–41]

Despite their potential advantages, access to non-PCC expertise was low overall, with only 10% to 30% of adults with diabetes reporting CHWs, diabetes educators, nutritionists, or other general staff as members of their care team. Patients of small and large CHCs sites have similar access to overall and specific interdisciplinary care team expertise, except patients of small CHC sites are more likely to report other general staff as care team members than patients at large CHC sites. Taken together, the results indicate that patients of small CHC sites do not necessarily have worse access to interdisciplinary care team expertise, potentially because CHC organizations and networks allow for small CHC sites to leverage centralized resources.

The relationship between broader primary care team expertise and better patients' experiences of chronic care, as measured by PACIC-11, was significant in small CHC sites but not large CHC sites. Patients of smaller primary care practices have fewer preventable hospital admissions[15] and better access to care compared with patients of larger primary care practices.[42] While smaller primary care practices have lower adoption of patient-centered medical home processes,[43–46] they can prioritize reforms that leverage their interpersonal advantages, such as professional team training or expanding the role of medical assistants to improve patient self management.[47,48] Physician retention has been found to be lower in CHC sites with lower visit volume,[49] small CHC sites may be better positioned to foster patient relationships through team-based care because non-PCCs are more prepared to maintain relational continuity with patients due to high PCC turnover.

In adjusted analyses, broader interdisciplinary care team expertise was not associated with HbA1c control for either 8.0% or 9.0% cut points. Patients in the analytic sample had an average of 3 comorbid conditions. It is difficult to achieve HbA1c control when patients have multiple comorbidities,[27,50] and broadening of primary care team expertise may have diminishing returns to patient self management, and consequently, HbA1c is not better for patients with access to broader team expertise.

Table 3. Predictors of Odds of Hemoglobin A1c (HbA1c) and Patients' Experiences of Chronic Care (PACIC-11), 2011 to 2012

	Model 1: Odds of HbA1c Control	Model 2: PACIC-11 Score
Overall team expertise	1.07 (0.11)	2.15* (1.02)
Large CHC site	0.76 (0.21)	1.89 (2.12)
Large CHC site # overall team expertise	0.92 (0.10)	−2.58* (1.04)
Interdisciplinary expertise on the primary care team:		
Community health worker	0.93 (0.26)	7.67† (2.68)
Diabetes educator	0.69 (0.15)	6.05† (2.00)
Nutritionist	1.05 (0.22)	5.21† (1.98)
Pharmacist	0.84 (0.19)	−0.17 (2.19)
Mental health provider	0.98 (0.34)	−0.42 (3.29)
Other staff	1.11 (0.24)	4.96* (2.03)
Total comorbidities	0.99 (0.04)	−0.03 (0.39)
Female	1.26 (0.20)	−1.96 (1.45)
Race/ethnicity/language		
Chinese-speaking Asian	0.99 (0.36)	−5.37 (2.89)
English-speaking Asian	0.58 (0.22)	10.73† (3.32)
English-speaking Latino	0.49* (0.17)	7.85† (3.00)
Spanish-speaking Latino	0.45* (0.14)	8.63† (2.74)
English-speaking Other	Ref.	Ref.
Insurance source		
Medicaid	Ref.	Ref.
Medicare	1.44 (0.58)	0.48 (3.34)
Other	0.70 (0.34)	3.62 (4.73)
Private	1.21 (0.29)	−1.87 (2.18)
Uninsured	1.30 (0.31)	−1.06 (2.07)
Age (years old)		
26 to 35	0.46 (0.19)	−0.36 (4.20)
36 to 45	0.43† (0.11)	2.61 (2.54)
46 to 55	0.58† (0.11)	−0.65 (1.84)
56 to 65	Ref.	Ref.
66 to 75	1.03 (0.25)	1.47 (2.11)
76+	1.29 (0.44)	−0.08 (2.84)
How long usual clinic (years)		
< 3	Ref.	Ref.
3 to 5	1.22 (0.24)	2.63 (1.78)
5+	1.09 (0.21)	2.45 (1.77)
Constant	0.88 (0.36)	50.97‡ (3.13)
Ψ	0.37 (0.14)	2.07 (2.19)
Θ		24.00 (0.48)
Observations	1125	1277

CHC, community health centers.
Standard errors in parentheses.
Model 1 displays odds ratio.
We were unable to assess 125 patients with no documentation of glycated hemoglobin (HbA1c) during the study period, leading to a Model 1 sub-sample of 1125.
*$P < .05$, †$P < .01$, ‡$P < .001$.

Our study also revealed important racial and ethnic disparities in diabetes care management. Spanish-speaking and English-speaking Latino patients were approximately half as likely to have controlled HbA1c than our reference group of English-speaking patients of other racial/ethnic backgrounds. These findings are consistent with evidence from a national study, which found that Latinos have worse HbA1c control than non-Latino white patients.[51] Both English and Spanish-speaking Latinos were less likely to have HbA1c controlled compared with other racial/ethnic groups, consistent with evidence that Spanish language preference was not associated with better glycemic control among Latino patients.[52] Latinos and English-speaking Asians had higher PACIC-11 scores than English-speaking patients of other racial/ethnic backgrounds. We are unable to assess why patients from certain racial and ethnic groups have different HbA1c control and experiences of chronic care, but previous analyses suggest factors we did not measure, including health literacy,[53,54] geographic variation,[55–57] and racial/ethnic patient-clinician concordance,[52,58] may account for differences.[53] These factors should be assessed in future research to understand whether they explain racial and ethnic differences in diabetes care management.

Our results advance previous research in important ways. Research in commercially insured populations found overall care team expertise to be associated with better diabetes self-management support, but the effect of specific interdisciplinary expertise was not assessed.[4] Our results extend evidence about the benefits of interdisciplinary care teams to CHCs, and our study includes care team members central to CHCs, including CHWs, diabetes educators, and general office staff such as medical assistants and clerks. The positive associations of access to CHWs, diabetes educators, and general office staff on experience of chronic care for patients with diabetes is important because these team members are more common in safety net settings. These team members are more likely to come from similar socioeconomic and cultural backgrounds as patients, thereby reducing social distance and increasing connectedness, compared with PCC-only care. Medical assistants are one of the most diverse of all medical profession work forces and can serve as the "invisible glue" of primary care.[47,48] CHWs are often "insiders"

from the community that can create bridges to health care delivery.[59] This study advances evidence about the benefits CHWs can have for diabetes care management for vulnerable populations.[60–63] Our results suggest that patients may experience fewer communication and trust barriers when CHWs are involved as care team members, and their involvement on primary care teams may promote positive experiences of chronic care.

Implementing team-based care can be disruptive to operational workflows and requires flexibility to address the varying needs and resources of individual CHC sites.[64–66] In resource-constrained CHCs, medical assistants are more likely than other staff to be pulled from their diabetes care management functions to support general operational tasks.[34] While team-based care requires adaptation to fit local needs, practice-based research highlights that implementing effective interventions requires protected staff time for diabetes care management, warm hand-offs from PCCs to interdisciplinary team members, active support from site leadership, and standardized performance measurement across sites.[34,67–69] Teams will need to allocate tasks differently depending on available expertise.[70,71] For example, CHWs and medical assistants are both well positioned to support diabetes self management, and although they have different training, they can have fulfill common diabetes care management functions within and across CHC sites.[27] Fidelity of implementation to interdisciplinary care team models has previously been associated with improved HbA1c control among adult patients with diabetes of a large medical group, but this relationship has yet to be assessed in CHCs.[72] To advance research and practice, it will be important to clarify how the structural and relational features of primary care teams and fidelity of implementation can enable improved diabetes management for socioeconomically vulnerable patients.[73]

The study results should be considered in light of some limitations. First, we rely on patient reports of interdisciplinary expertise and cannot verify care team involvement. This study provides the opportunity to understand expertise that the patients directly identify as being involved in their chronic care. Doing so, however, may exclude "invisible" team members to patients, although patients' perspectives provide critical information about care teams.[11] Second, "other staff" can include medical assistants, clerks, and other nonclinical staff, and we are unable to disentangle these roles. There is likely more overlap in the tasks performed by these staff members compared with clinicians, however, as they do not have strict licensing and training requirements.[74–77] Third, we cannot assess causal relationships using cross-sectional data and we are unable to rule out bias due to survey nonresponse. Nonresponse analyses indicate minor differences in age and race/ethnicity/language between respondents and nonrespondents (data not shown). To account for any differences, we include patient sex, age, race/ethnicity/language, insurance information, total comorbidities, and how long the site has been their usual clinic to help account for potential confounders. Further, we incorporate IPTW as a sensitivity analyses to account for potential selection bias. Finally, we are unable to assess how well non-PCC expertise is integrated into routine primary care. Information about team relational coordination and role clarity might elucidate the null HbA1c findings, as prior research highlights that factors beyond a care team's structure can impact patient outcomes.[78–80]

Conclusion

Over the past decade, CHCs have implemented diabetes self-management support,[81,82] but team-based models have the potential to be expanded to better support socioeconomically vulnerable patients. Interdisciplinary primary care team development in CHCs is critical because of the challenges of recruitment, burnout, and turnover.[6–8] Access to CHWs, diabetes educators, nutritionists, and other general staff support positive patients' experiences of chronic care. In small CHC sites, patients report better experiences of chronic care when they have broader access to expertise as well as access to specific interdisciplinary team members. Efforts to advance patient-centered care in CHCs should expand patient access to interdisciplinary expertise to support diabetes care management.

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