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Research Article

Provider Teams and Patient Experiences

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Abstract

Objectives: Among primary care organizations participating in a State Innovation Model (SIM) program, estimate the association between care team composition and patient experience along four dimensions: timeliness of care, communication, coordination, and staff courtesy. Examine whether that association varies by patient health. Study **Design:** Retrospective cross-sectional analyses using survey data from primary care organizations linked with patient experience scores. **Methods:** Care team composition was measured using the numbers of primary care practitioners and other clinical staff in each primary care organization. Multi-level linear regression models were used to assess the association between primary care team composition and patient experiences, controlling for potentially confounding variables. Multi-level models were also estimated with an interaction between team composition and health status included. **Results:** The number of clinical staff in a practice had a small but statistically significant positive association with three measures of patient experience: communication, coordination, and staff courtesy. There was no significant association with timeliness of care. **Conclusions:** Using clinical staff to support primary providers in a practice may improve patient experiences of care, regardless of patient health. Furthermore, this approach does not appear to disrupt the primary care provider-patient relationship.

Keywords: Primary care; Patient experience; Care team composition

Introduction

The Center for Medicare & Medicaid Innovation (CMMI) awarded Connecticut a State Innovation Model (SIM) grant in 2014 to support healthcare payment and delivery model reforms aimed at bolstering the role of primary care to improve health system performance, increase quality of care, and decrease costs. Many of the CMMI initiatives emphasized furthering team-based, patient-centered care models.

In recent years, there has been increasing emphasis on the importance of patient-centered care, or care that is responsive to individual patient preferences and needs [1]. In addition to being an important indicator of patient-centered care, positive patient experiences are positively associated with patient safety and clinical effectiveness across a wide range of disease areas, settings, outcome measures, and study designs [2,3]. Furthermore, the Centers for Medicare & Medicaid Services (CMS) and other payers have incorporated patient experience measures into performance-based incentive systems [1].

Team-based hospital care has been shown to be positively associated with better patient experiences, but less is known about how care team composition impacts patient experiences in outpatient settings, particularly in primary care [4]. Despite a policy on implementing primary care models that incorporate non-physician staff and the emergence of patient experience surveys as an important quality measure, there have been inconsistent results on the association between these primary care models and patient experiences of care [5-7]. In primary care settings, patients may have longstanding, trusted relationships with their physicians [8] and some have suggested that using clinical staff for certain functions may disrupt the relationship between a patient and his or her primary care provider (PCP) by splintering care across multiple providers [9,10]. Furthermore, research on patient experience has focused on patient predictors of patient experience (e.g., patient

age, health, or race) rather than organizational factors (e.g., practice size, specialty, or hospital affiliations) [11-14]. This has led to a lack of information about whether organizational commitment to and investment in the mix of providers meaningfully affects patient experiences in those settings.

In this study, we use data from a SIM project in Connecticut to evaluate the association between an indicator of team composition, the number of non-physician staff and the number of PCPs, and patient care experiences in primary care practices. We also evaluate whether the relationship between care team composition and patient experiences differs by patients' reported health status. Our hypothesis was that there would be a greater benefit of additional staff for care among sicker patients.

Methods

Data Sources

The data for these analyses were collected as part of a Connecticut SIM project. Data were collected using two surveys: a Primary Care Organization Survey and a Clinician and Group Consumer Assessment of Healthcare Providers and Systems (CG-CAHPS) survey.

The 40-question Primary Care Organization Survey evaluated four aspects of primary care organizations: 1) organizational characteristics and governance; 2) health information technology; 3) quality improvement; and 4) clinical care delivery. Primary care practices in Connecticut that were engaged in the SIM transformation project and participating in one or more value-based contracts with commercial, Medicare and/or Medicaid payers were involved in the SIM project. Twenty primary care organizations with commercial contracts and 17 Federally Qualified Health Centers (FQHCs), which predominantly serve Medicaid patients, were invited to participate. Individuals who completed the survey on behalf of their organizations were Chief Executive Officers, Chief Operating Officers, or Chief Quality Officers. Data were collected via the online survey platform, Qualtrics, from October 2019 to January 2020. Practices were reminded by phone calls to complete the survey in December 2019. Eleven primary care organizations with commercial contracts and 12 FQHCs responded to the survey, totalling 23 respondent organizations (62% response rate). A total of N=19 organizations had data on all variables of interest and were included in the analyses.

The CG-CAHPS survey asked patients about care experiences, augmented with questions about aspects of care most salient to PCMH-designated organizations. The surveys were administered to a probability sample of primary care patients in CT. The sample was a stratified cluster sample with clustering of patients by primary care organization. A sample of Medicaid patients and patients covered by three large commercial insurance plans was drawn from each participating primary care organization in the state. Approximately equal numbers of patients (unless constrained by total number of patients) were selected from each primary care organization. Those with Medicaid were surveyed by

telephone from July 2019 to October 2019. Those with commercial insurance were surveyed by mail from November 2019 to January 2020. The numbers of patient respondents from organizations that participated in the organizational survey were: Medicaid: 3,087 (out of 87,160 called); Commercial: 3,675 (out of 28,852 mailed). Only respondents with complete survey responses in the N=19 organizations of interest were included in this analysis, leading to a final sample of 2,982 Medicaid and 3,125 Commercial patients (total patients N=6107).

Measures

We calculated the number of clinical support staff and PCPs (employed and affiliated) within an organization using responses to two questions from the Primary Care Organization Survey. The questions that were used to construct this measure were:

• … indicate the number of providers employed and affiliated within your network who are predominantly dedicated to providing primary care. (MD / DO)

• … estimate the unduplicated number of staff members by professional category dedicated to primary care. …

(Categories of professionals included: Employed & affiliated PAs, employed & affiliated APRNs, Care Management/Coordination Registered Nurses (RNs) & Licensed Practical Nurses (LPNs), Care Management/Coordination Social Workers or similar, Licensed Practical Nurses (Clinical), Registered Nurses (Clinical), Patient Navigators, Chronic Disease Educator (e.g., Asthma, Diabetes))

For the main analyses we defined primary care practitioners (PCPS) as MDs, DOs, PAs, and APRNs. For the measure of clinical staff, we included: Care Management/Coordination RNs & LPNs, Care Management/Coordination Social Workers or similar, LPNs (Clinical), RNs (Clinical), Patient Navigators, and Chronic Disease Educators (e.g., Asthma, Diabetes). In sensitivity analyses we used the number of only MDs and DOs for the measure of PCPs and included PAs and APRNs in the measure of staff (Total Staff).

The dependent variable was the quality of patient experiences, assessed at the patient level using responses from the 2019 wave of the SIM CG-CAHPS survey. We used four summary measures of patient experiences: timeliness of care, communication, coordination, and staff courtesy [15]. Each summary measure was the average of valid responses to questions in that dimension. Each measure was calculated on a 0-100 scale, with 100 representing the most positive experience.

Covariates also included organizational-level variables. Organizational type was included, as respondent organizations included both organizations which predominantly served commercially insured patients, and Federally Qualified Health Centers (FQHCs), which predominantly served Medicaid patients. Given inherent differences in patient mix, organizational size, and access to specialty providers that might differ by hospital affiliation

status, commercial organizations were divided into two groups: no hospital affiliation and hospital affiliation. None of the FQHC organizations had a hospital affiliation (Table 1).

Analyses

Descriptive statistics were used to describe patient and organizational characteristics, as well as overall CG-CAHPS results. Multi-level linear regression models were used to assess the association between care team composition (number of clinical support staff and number of PCPs) and patient experiences, controlling for potentially confounding variables. Patient-level covariates included patient sex, age, patient physical health status, patient mental health status, patient race (white vs non-white), and education, all of which have been found in prior research to be associated with patient experience [15-19].

Multi-level models treated patients as clustered within primary care organizations. Models were first estimated with just main effects for care team composition and then an interaction between number of staff and health status was included to investigate whether the care of patients in poor health was affected more by number of staff.

Results

The mean number of MD/DOs per organization was 98.3 (median 40.0) and the mean number of total staff was 72.9 (median 40) (Table 1). The average ratio of total staff to MD/DOs was 1.8 (median 1.1). There were no practices with zero total staff.

Organization type	
Commercial - hospital affiliation	7 (36.8%)
Commercial - no hospital affiliation	3 (15.8%)
FQHC	9 (47.4%)
Number of clinical staff[*]	
Mean (SD)	39.8 (53.7)
Median (Range)	23.0 (0.0 – 186.0)
Number PCP (MD/DO, APRN, PA)	
Mean (SD)	131.3 (139.2)
Median (Range)	53.0 (10.0 – 415.0)
Number of total staff (clinical staff plus APRNs and PAs)	
Mean (SD)	72.9 (83.0)
Median (Range)	40.0 (8.0 – 307.0)
Number of MD/DO	
Mean (SD)	98.3 (116.6)
Median (Range)	40.0 (2.0 – 360.0)
Number patients seen in past year	
Mean (SD)	65584.9 (68267.3)
Median (Range)	34163.0 (2683.0 – 225000.0)

[*]Clinical staff include Care Management/Coordination Registered Nurses (RNs) & Licensed Practical Nurses (LPNs), Care Management/ Coordination Social Workers or similar, Licensed Practical Nurses (Clinical), Registered Nurses (Clinical), Patient Navigators, and Chronic Disease Educators (e.g., Asthma, Diabetes.

Abbreviations: FQHC: Federally Qualified Health Centers; PCP: Primary Care Provider; MD: Medical Doctor; DO: Doctor of Osteopathic Medicine; APRN: Advanced Practice Registered Nurse; PA: Physician Assistant

Table 1: Organizational Characteristics; N=19.

The majority of patients (Table 2) were female (62.8%) and under 65 years of age (88.7%). The majority of patients were white (63.8%) and had less than a college education (64.6%). Most patients described their physical health as "Very Good" (34.1%) or "Good" (35.7%). Patients generally reported positive healthcare experiences. The mean CG-CAHPs score was above 85 (on a 0-100 scale) for all four of the outcome scales (Table 3). "Timeliness of care" had the lowest mean (87.1), and "Communication" had the highest (93.9).

Characteristic	n (%)
Sex	
Male	2247 (37.2%)
Female	3794 (62.8%)
Age	
18 to 24	241 (4.0%)
25 to 34	680 (11.2%)
35 to 44	919 (15.2%)
45 to 54	1268 (21.0%)
55 to 64	2253 (37.3%)
65 to 74	530 (8.8%)
75 or older	155 (2.6%)
Health Status	
Excellent	825 (13.7%)
Very Good	2058 (34.1%)
Good	2157 (35.7%)
Fair	828 (13.7%)
Poor	171 (2.8%)
Mental Health Status	
Excellent	1339 (22.2%)
Very Good	1907 (31.6%)
Good	1968 (32.6%)
Fair	675 (11.2%)
Poor	145 (2.4%)
Race	
White	3899 (63.8%)
Non-White	2208 (36.2%)
Education	
8th grade or less	153 (2.5%)
Some high school, but did not graduate	408 (6.8%)
High school graduate or GED	1902 (31.5%)
Some college or 2-year degree	1439 (23.8%)
4-year college graduate	1021 (16.9%)
More than 4-year college degree	1114 (18.5%)

Table 2: Characteristics of Patients; N=6107.

Experience Characteristic	Mean (SD)
Timeliness of care (n=5225)	87.1 (21.8)
Communication (n=5615)	93.9 (15.4)
Coordination (n=5611)	89.4 (19.3)
Staff courtesy (n=5610)	90.4 (19.3)

Table 3: CG-CAHPS Scores.

Multi-level linear regression models of the relationship between care team composition and patient experience (Table 4) indicated that having more clinical staff was significantly associated with higher patient experience scores for: communication (coefficient = 0.02, p=0.02), coordination (coefficient = 0.03, p=0.005), and staff courtesy (coefficient = 0.02, p=0.01). That is, an increase in the number of staff by 100 (about 2 SD) is associated with an increase in communication and staff courtesy scores by 2 points and an increase in coordination by 3 points. The association of staff with timeliness of care was not significant (p=0.12).

Predictor	Timeliness of care		Communication		Coordination		Staff courtesy	
	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Number PCP	-0.01 (0.01)	0.39	-0.01 (0.004)	0.21	-0.01 (0.01)	0.3	-0.01 (0.01)	0.3
Number of clinical staffs	0.03 (0.02)	0.12	**0.02 (0.01)**	**0.02**	**0.03 (0.01)**	**0.005**	**0.02 (0.01)**	**0.01**
Organization type								
Commercial - hospital affiliation (ref)								
Commercial - no hospital affiliation	-2.6 (2.7)	0.34	-2.04 (1.12)	0.07	-2.44 (1.74)	0.16	**-3.58 (1.45)**	**0.01**
FQHC	1.01 (2.31)	0.66	0.14 (0.99)	0.89	**3.17 (1.5)**	**0.04**	1.9 (1.27)	0.14
Patient sex (female vs male)	-1.1 (0.62)	0.08	0.07 (0.43)	0.86	-0.45 (0.53)	0.39	**-2.1 (0.53)**	**<.0001**
Patient health								
Excellent (ref)								
Very good	**-2.84 (1.05)**	**0.01**	**-1.59 (0.72)**	**0.03**	**-2.64 (0.9)**	**0.003**	-1.03 (0.9)	0.25
Good	**-5.07 (1.11)**	**<.0001**	**-2.36 (0.76)**	**0.002**	**-3.68 (0.94)**	**<.0001**	**-2.75 (0.94)**	**0.004**
Fair	**-5.8 (1.36)**	**<.0001**	**-3.88 (0.93)**	**<.0001**	**-4.65 (1.15)**	**<.0001**	**-2.28 (1.15)**	**0.049**
Poor	**-9.39 (2.19)**	**<.0001**	**-8.97 (1.51)**	**<.0001**	**-8.98 (1.87)**	**<.0001**	**-7.48 (1.87)**	**<.0001**
Patient mental health								
Excellent (ref)								
Very good	-0.25 (0.9)	0.78	0.23 (0.62)	0.71	-0.67 (0.76)	0.38	0.03 (0.77)	0.96
Good	0.24 (0.96)	0.8	-0.78 (0.66)	0.24	-1.02 (0.81)	0.21	-0.73 (0.82)	0.37
Fair	**-2.86 (1.27)**	**0.02**	**-3.02 (0.87)**	**0.001**	**-4.67 (1.08)**	**<.0001**	**-2.31 (1.09)**	**0.03**
Poor	-1.72 (2.28)	0.45	-2.52 (1.55)	0.1	-3.31 (1.92)	0.08	-2.82 (1.92)	0.14

Note: Results in bold are significant at the 0.05 level. Patient demographic variables (race (white vs not white), age, and education) are not shown in Tables, but were included in the models to account for differences in case mix. Results available upon request.

Table 4: Predictors of CAHPS Scores.

Compared to FQHCs, organizations with a hospital affiliation that predominantly served commercially insured patients were associated with poorer experience scores for coordination. Experience scores also differed by hospital affiliation status for staff courtesy, with patients of commercial primary care groups that were hospital affiliated reporting better experiences than those with no hospital affiliation. Worse patient health was associated with worse experience across all four models, consistent with earlier findings [15]. "Fair" patient mental health (rather than "Excellent") was also negatively associated with worse experiences for all four of the outcomes modeled.

Models with an interactive term between patient health and number of clinical staff showed that the overall interaction between health and clinical staff was not significant for timeliness of care (p=0.12), although the number of clinical staff was more important for timeliness of care for patients in poor health than for those in excellent health (p=0.01) (Table 5). The overall interaction term was also not statistically significant for the other three outcomes (communication (p=0.64), coordination (p=0.61), staff courtesy (p=0.46)).

Predictor	Timeliness of care		Communication		Coordination		Staff courtesy	
	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Number of clinical staff	0.03 (0.02)	0.27	0.02 (0.01)	0.06	0.02 (0.02)	0.26	0.02 (0.01)	0.29
Patient health								
Excellent (ref)								
Very good	**-2.88 (1.33)**	**0.03**	-1.14 (0.91)	0.21	**-3.64 (1.13)**	**0.001**	-1.37 (1.13)	0.23
Good	-5.19 (1.37)	**<.001**	**-2.27 (0.94)**	**0.02**	**-4.57 (1.16)**	**<.0001**	**-3.16 (1.16)**	**0.01**
Fair	-6.40 (1.65)	**<.001**	**-3.43 (1.13)**	**0.002**	**-5.38 (1.4)**	**<.001**	**-3.34 (1.41)**	**0.02**
Poor	-13.05 (2.65)	**<.0001**	**-9.76 (1.82)**	**<.0001**	**-10.51 (2.26)**	**<.0001**	**-9.44 (2.26)**	**<.0001**
Interaction Number of clinical staff*Patient Health								
Excellent (ref)								
Very good	0.00 (0.02)	0.97	-0.01 (0.01)	0.43	0.02 (0.01)	0.14	0.01 (0.01)	0.63
Good	0.00 (0.02)	0.88	0.00 (0.01)	0.9	0.02 (0.01)	0.19	0.01 (0.01)	0.57
Fair	0.01 (0.02)	0.51	-0.01 (0.01)	0.5	0.01 (0.02)	0.42	0.02 (0.02)	0.18
Poor	**0.10 (0.04)**	**0.01**	0.02 (0.03)	0.37	0.04 (0.03)	0.28	0.05 (0.03)	0.14
Number PCP	-0.01 (0.01)	0.4	-0.01 (0.004)	0.21	-0.01 (0.01)	0.3	-0.01 (0.01)	0.32
Organization type								
Commercial - hospital affiliation (ref)								
Commercial - no hospital affiliation	-2.5 (2.7)	0.36	-2 (1.11)	0.07	-2.42 (1.74)	0.16	**-3.53 (1.48)**	**0.02**
FQHC	1.12 (2.3)	0.63	0.17 (0.98)	0.87	**3.19 (1.5)**	**0.03**	1.98 (1.29)	0.13
Patient sex (female vs male)	-1.07 (0.62)	0.08	0.08 (0.43)	0.86	-0.44 (0.53)	0.41	**-2.08 (0.53)**	**<.0001**
Patient mental health								
Excellent (ref)								
Very good	-0.25 (0.9)	0.78	0.2 (0.62)	0.75	-0.64 (0.76)	0.4	0.06 (0.77)	0.94
Good	0.25 (0.96)	0.8	-0.8 (0.66)	0.23	-0.98 (0.81)	0.23	-0.71 (0.82)	0.38
Fair	**-2.84 (1.27)**	**0.03**	**-3.06 (0.88)**	**<.001**	**-4.66 (1.08)**	**<.0001**	**-2.24 (1.09)**	**0.04**
Poor	-1.95 (2.28)	0.39	-2.63 (1.55)	0.09	-3.35 (1.92)	0.08	-2.87 (1.93)	0.14

Note: Results in bold are significant at the 0.05 level. Patient demographic variables (race (white vs not white), age, and education) are not shown in Tables, but were included in the models to account for differences in case mix. Results available upon request.

Table 5: Multi-Level Regression Results for Models with Interactions.

When we re-estimated the models using a PCP variable composed of just MDs and DOs and a separate variable representing all staff (total staff), the results were comparable (See Supplemental Tables S1 and S2).

Predictor	Timeliness of care		Communication		Coordination		Staff courtesy	
	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Number MD/DO	-0.01 (0.01)	0.26	-0.01 (0.005)	0.11	-0.01 (0.01)	0.23	-0.01 (0.01)	0.27
Number of total staff*	0.02 (0.01)	0.11	**0.01 (0.005)**	**0.02**	**0.02 (0.01)**	**0.01**	**0.01 (0.01)**	**0.03**
Organization type								
Commercial - hospital affiliation (ref)								
Commercial - no hospital affiliation	-2.58 (2.67)	0.33	-2.04 (1.1)	0.06	-2.42 (1.8)	0.18	**-3.57 (1.51)**	**0.02**
FQHC	0.68 (2.34)	0.77	-0.06 (0.99)	0.95	3.02 (1.6)	0.06	1.83 (1.35)	0.18
Patient sex (female vs male)	-1.09 (0.62)	0.08	0.08 (0.43)	0.86	-0.45 (0.53)	0.40	**-2.09 (0.53)**	**<.0001**
Patient health								
Excellent (ref)								
Very good	**-2.84 (1.05)**	**0.01**	**-1.59 (0.72)**	**0.03**	**-2.64 (0.9)**	**0.003**	-1.04 (0.9)	0.25
Good	**-5.07 (1.11)**	**<.0001**	**-2.36 (0.76)**	**0.002**	**-3.68 (0.94)**	**<.0001**	**-2.76 (0.94)**	**0.004**
Fair	**-5.8 (1.36)**	**<.0001**	**-3.87 (0.93)**	**<.0001**	**-4.66 (1.15)**	**<.0001**	**-2.28 (1.15)**	**0.048**
Poor	**-9.39 (2.19)**	**<.0001**	**-8.97 (1.51)**	**<.0001**	**-8.98 (1.87)**	**<.0001**	**-7.49 (1.87)**	**<.0001**
Patient mental health								
Excellent (ref)								
Very good	-0.25 (0.9)	0.78	0.23 (0.62)	0.71	-0.67 (0.76)	0.38	0.04 (0.77)	0.96
Good	0.24 (0.96)	0.80	-0.77 (0.66)	0.24	-1.02 (0.81)	0.21	-0.72 (0.82)	0.38
Fair	**-2.86 (1.27)**	**0.02**	**-3.02 (0.87)**	**<.001**	**-4.67 (1.08)**	**<.0001**	**-2.3 (1.09)**	**0.03**
Poor	-1.72 (2.28)	0.45	-2.53 (1.55)	0.10	-3.31 (1.92)	0.08	-2.82 (1.92)	0.14

*Total staff includes APRN and PA in addition to the clinical staff in the manuscript. Note: Results in bold are significant at the 0.05 level. Patient demographic variables (race (white vs not white), age, and education) are not shown in Tables, but were included in the models to account for differences in case mix. Results available upon request.

Supplemental Table S1: Predictors of CAHPS Scores (using number of total staff and number MD/DO).

Predictor	Timeliness of care		Communication		Coordination		Staff courtesy	
	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Number of total staff*	0.02 (0.01)	0.26	**0.02 (0.01)**	**0.04**	0.01 (0.01)	0.28	0.01 (0.01)	0.43
Patient health								
Excellent (ref)								
Very good	**-2.85 (1.44)**	**0.047**	-0.99 (0.98)	0.31	**-3.7 (1.21)**	**0.002**	-1.61 (1.22)	0.19
Good	**-5.14 (1.47)**	**<.001**	**-2.06 (1.00)**	**0.04**	**-4.61 (1.24)**	**<.001**	**-3.29 (1.24)**	**0.01**
Fair	**-6.55 (1.76)**	**<.001**	**-3.38 (1.2)**	**0.01**	**-5.39 (1.49)**	**<.001**	**-3.41 (1.5)**	**0.02**
Poor	**-13.03 (2.81)**	**<.0001**	**-9.3 (1.93)**	**<.0001**	**-10.34 (2.39)**	**<.0001**	**-9.52 (2.39)**	**<.0001**
Interaction Number of total staff* Patient Health								
Excellent (ref)								
Very good	0.00 (0.01)	0.99	-0.01 (0.01)	0.37	0.01 (0.01)	0.20	0.01 (0.01)	0.49
Good	0.00 (0.01)	0.96	0 (0.01)	0.67	0.01 (0.01)	0.26	0.01 (0.01)	0.53
Fair	0.01 (0.01)	0.48	-0.01 (0.01)	0.54	0.01 (0.01)	0.50	0.01 (0.01)	0.24
Poor	**0.06 (0.03)**	**0.03**	0.01 (0.02)	0.70	0.02 (0.02)	0.42	0.03 (0.02)	0.19
Number MD/DO	-0.01 (0.01)	0.28	-0.01 (0)	0.11	-0.01 (0.01)	0.23	-0.01 (0.01)	0.29
Organization type								
Commercial - hospital affiliation (ref)								
Commercial - no hospital affiliation	-2.47 (2.67)	0.36	-2.02 (1.09)	0.06	-2.4 (1.8)	0.18	**-3.53 (1.54)**	**0.02**
FQHC	0.8 (2.34)	0.73	-0.04 (0.99)	0.97	3.04 (1.6)	0.06	1.91 (1.38)	0.17
Patient sex (female vs male)	-1.07 (0.62)	0.09	0.08 (0.43)	0.86	-0.44 (0.53)	0.41	**-2.08 (0.53)**	**<.0001**
Patient mental health								
Excellent (ref)								
Very good	-0.24 (0.9)	0.79	0.2 (0.62)	0.74	-0.64 (0.76)	0.41	0.07 (0.77)	0.93
Good	0.26 (0.96)	0.79	-0.79 (0.66)	0.23	-0.97 (0.81)	0.23	-0.69 (0.82)	0.40
Fair	**-2.82 (1.27)**	**0.03**	**-3.05 (0.88)**	**<.001**	**-4.65 (1.08)**	**<.0001**	**-2.25 (1.09)**	**0.04**
Poor	-1.87 (2.28)	0.41	-2.59 (1.55)	0.09	-3.32 (1.92)	0.08	-2.85 (1.93)	0.14

*****Total** staff includes APRN and PA in addition to the clinical staff in the manuscript. Note: Results in bold are significant at the 0.05 level. Patient demographic variables (race (white vs not white), age, and education) are not shown in Tables, but were included in the models to account for differences in case mix. Results available upon request.

Supplemental Table S2: Multi-Level Regression Results for Models with Interactions (using number of total staff and number MD/DO).

Discussion

Measures of patient experience are an increasingly important indicator of health care quality. In this study of primary care practices in Connecticut, the presence of more clinical staff in the organization had a small, but statistically significant association, with three measures of patient experiences: communication, coordination, and staff courtesy. The models suggest that 100 more staff would be associated with an increase in communication and staff courtesy scores by about 2 points and coordination scores by about 3 points. This would be a very large change for most of the study organizations. We did not have sufficient variability to test whether this effect varied by the size of the organization.

Although there is not a standard method for assessing the practical implications of differences in CAHPS scores, several methods have been proposed [16]. Quigley et al. suggested three main approaches, including comparing by: (1) distribution/range of patient experience variable, (2) against external anchor, and (3) a difference in patient experience on one covariate to differences in patient experience on other covariates [17]. Considering the second approach (an external anchor), a 2013 article by Paddison, et al. suggested a threshold of 1 point for small, 3 points for medium, and 5 points for large differences on the 0-100 possible score range [18]. Using this approach to interpret the results of this analysis, the difference attributable to increases in 100 staff would be considered small for the measured outcomes. Earlier research has highlighted that CAHPS scores can be difficult to improve, highlighting the practical significance of even small differences [7].

Increases in the relative number of clinical staff did not have a significant effect on timeliness of care, which suggests that the speed with which care is delivered may be most impacted by other organizational or physician-level characteristics (e.g., access to telehealth has been shown to improve timely access to care) [19].

There were several potential limitations of these analyses. Because the data used are cross-sectional, it was not possible to conclude that the associations are causal. As with any survey research, not all subjects responded to the surveys, and we do not have data to assess the representativeness of respondents. Thus, we do not know how well the results generalize to the entire population. Measures of association should be less subject to this limitation, however, than means. In addition, the survey administration method differed between the commercial and the Medicaid survey. Patients with commercial insurance received the CG-CAHPS survey in the mail, while patients with Medicaid received a phone call during which an interviewer asked them about their healthcare experiences. It was not possible to control for this difference in the analysis, and the differences observed by organizational type may be partially attributable to differences in survey administration. In considering which covariates to include, the literature review revealed several physician-level variables that could not be included in this analysis due to data limitations. Previous analyses have shown that having a female physician is associated with higher patient satisfaction [20-22], and that differences in physician personality and communication style affect patient satisfaction; however, data related to physician personality or communication style were not available in this study [23].

Finally, there are several inherent limitations to the measurement of team composition in this study. Although we had measures of the number of primary care physicians and other clinical staff, we do not know how well they coordinated their work. In practice, the way groups of providers or teams of providers work in a coordinated fashion varies substantially within and across organizations, and structural teams do not necessarily produce collaboration between team members [24]. Earlier work on chronic disease management has suggested that patients may prefer provider continuity, and that continuous relationships with providers may be critical for chronically ill patients [25]. We were not able to determine the level of collaboration present among the providers or the continuity of a patients' relationship with their care team.

Conclusions

Despite the limitations of this study, there are several implications of the results. Most notably, this analysis suggests that policy efforts to support the use of a broader array of clinicians and clinical staff members in care teams to supplement physicians care could have a positive effect on several domains of patient experience. This study does not support the concern that using non-physician providers disrupts the doctor-patient relationship, as the addition of non-physician providers was associated with better patient experiences.

Acknowledgements

References

1. Agency for Healthcare Research and Quality (2020) Section 2: Why Improve Patient Experience?

2. Doyle C, Lennox L, Bell D (2013) A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. BMJ Open 3: e001570.

3. Zolnierek KBH, Dimatteo MR (2009) Physician communication and patient adherence to treatment: A meta-analysis. Med Care 47: 826-834.

4. Will KK, Johnson ML, Lamb G (2019) Team-Based Care and Patient Satisfaction in the Hospital Setting: A Systematic Review. J Patient Cent Res Rev 6: 158-171.

5. Wen J, Schulman KA (2014) Can team-based care improve patient satisfaction? A systematic review of randomized controlled trials. PLoS One 9: e100603.

6. Nembhard IM, Buta E, Lee YSH, Anderson D, Zlateva I, et al. (2020) A quasi-experiment assessing the six-months effects of a nurse care coordination program on patient care experiences and clinician teamwork in community health centers. BMC Health Serv Res 20: 137.

7. Swankoski KE, Peikes DN, Morrison N, Holland JJ, Duda N, et al. (2018) Patient experience during a large primary care practice transformation initiative. Am J Manag Care 24: 607-613.

8. Goold SD, Lipkin M Jr (1999) The doctor-patient relationship: challenges, opportunities, and strategies. J Gen Intern Med 14: S26-S33.

9. Schottenfeld L, Petersen D, Peikes D, Ricciardi R, Burak H, et al. (2016) Creating Patient-Centered Team-Based Primary Care. AHRQ Pub. No. 16-0002-EF. Rockville, MD: Agency for Healthcare Research and Quality.

10. Wagner EH, Reid RJ (2007) Are continuity of care and teamwork incompatible? Med Care 45: 6-7.

11. Rahmqvist M (2001) Patient satisfaction in relation to age, health status and other background factors: a model for comparisons of care units. International journal for quality in health care: journal of the Int J Qual Health Care 13: 385-390.

12. Ibid.

13. Martin AE, D'Agostino JA, Passarella M, Lorch SA (2016) Racial differences in parental satisfaction with neonatal intensive care unit nursing care. J Perinatol 36: 1001-1007.

14. Murray-García JL, Selby JV, Schmittdiel J, Grumbach K, Quesenberry CP Jr (2000) Racial and ethnic differences in a patient survey: patients' values, ratings, and reports regarding physician primary care performance in a large health maintenance organization. Med Care 38: 300-310.

15. Agency for Healthcare Research and Quality (2017) Patient Experience Measures from the CAHPS Clinician & Group Survey Document No. 2309.

16. Lied TR, Sheingold SH, Landon BE, Shaul JA, Cleary PD (2003) Beneficiary reported experience and voluntary disenrollment in Medicare managed care. Health Care Fin Rev 25: 55-66.

17. Ibid.

18. Paddison CAM, Elliott MN, Haviland AM, Farley DO, Lyratzopoulos G, et al. (2013) Experiences of care among Medicare beneficiaries with ESRD: Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey results. Am J Kidney Dis 61: 440-449.

19. Donelan K, Barreto EA, Sossong S, Michael C, Estrada JJ, et al. (2019) Patient and clinician experiences with telehealth for patient follow-up care. Am J Manag Care 25: 40-44.

20. Derose KP, Hays RD, McCaffrey DF, Baker DW (2001) Does physician gender affect satisfaction of men and women visiting the emergency department? J Gen Intern Med 16: 218-226.

21. Bertakis KD, Franks P, Azari R (2003) Effects of physician gender on patient satisfaction. J Am Med Womens Assoc (1972) 58: 69-75.

22. Prasad T, Buta E, Cleary PD (2021) Is Patient-Physician Gender Concordance Related to the Quality of Patient Care Experiences? J Gen Intern Med 36: 3058-3063.

23. Duberstein P, Meldrum S, Fiscella K, Shields CG, Epstein RM (2007) Influences on patients' ratings of physicians: Physicians demographics and personality. Patient Educ Couns 65: 270-274.

24. Chesluk BJ, Holmboe ES (2010) How teams work--or don't--in primary care: a field study on internal medicine practices. Health Aff (Millwood) 29: 874-879.

25. Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, et al. (2001) Improving chronic illness care: translating evidence into action. Health Aff (Millwood) 20: 64-78.