Medical home components associated with self-reported improvements in delivery of patient-centered care in VA primary care

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A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2013

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Program Authorized to Offer Degree:

Public Health, Health Services

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Abstract

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Objective: This study describes the relationship between medical home components in the VA Patient-Aligned Care Team (PACT) initiative and personnel-reported improvements in care, and the variation of this relationship across primary care occupations. Design: Data are drawn from the 2012 PACT Primary Care Personnel Survey, a nationwide survey of VA primary care personnel. Methods: The associations between PACT components and personnel-reported improvement in care are investigated using chi-square tests for the 4,819 survey respondents in occupations comprising the core care team. Results: There is largely a positive association between the level of implementation of PACT medical home components and personnel-reported improvements in patient-centered care with some important variation by occupation. Conclusions: Primary care personnel in different occupations perceive quality and medical home components differently. PACT components associated with perceived improvements in care in this study may represent valuable areas of focus for PCMH evaluation efforts and targeted medical home improvements.

Introduction:

The Patient Centered Medical Home (PCMH)

The traditional model of primary care, with the full range of recommended preventative, health promotion, acute, and chronic care services delivered to a panel of patients by a single physician, is facing fundamental challenges. Many primary care physicians report feeling as though they are practicing medicine on a "hamster wheel," facing ongoing pressure to see more patients in shorter appointments with less pay.[1] By some estimates, it would take 21.7 hours per day for a physician to provide this full spectrum of care for an average panel of 2,500 patients.[2,3,4]

There is increasing interest in Patient Centered Medical Home (PCMH) models as a way to address growing concerns regarding the current dysfunctional system of primary care provision coupled with the high costs and often suboptimal outcomes associated with healthcare in the United States.[5,6,7,8,9] The Patient Protection and Affordable Care Act (HR3590) passed in 2010 includes federal PCMH demonstration programs and medical home pilots[10] while implementation strategies are underway in most states across the nation.[11]

The core components of a PCMH model generally emphasize the tenets of primary care, including ensuring access, continuity of care with the same provider or team, coordinated and comprehensive care, along with a focus on the chronic care model, enhanced use of health information technology, innovative reimbursement models, and a team-based care structure.[12]

The team-based care emphasized in the PCMH model seeks to improve quality through better allocation of clinical tasks to various team members. The simultaneous addition of health professionals with specialized skillsets to the clinical unit contributes to improvement in the range of services available to care for complex and chronically ill patients.[13,14]

The Veterans Health Administration PCMH Initiative

In 2010 the Veterans Health Administration (VA) launched its own national medical home initiative called Patient Aligned Care Teams (PACT). The changes this program made to existing clinical practice included a reorganization of primary care staffing into both a core and expanded team model.[15] At the core care-team level, a primary care provider, nurse care manager, clinical staff assistant, and administrative staff member now serve as a given patient's "teamlet", providing continuity of care for patients across clinic visits. Other healthcare professionals at a given clinic site, including pharmacists, social workers, nutritionists, psychologists, and disease management coaches[16] continue to serve as expanded team members by providing care to patients on an episodic basis.[15]

The national implementation of PACTs in outpatient clinics was initiated through the intensive training of a core group of providers within regional learning collaboratives and through five regional VA Demonstration Laboratories.[16] In the initial stages of PACT implementation, from March 2010 to December 2011, the VA invested substantial financial resources to increase the ratio of support staff to primary care providers, with this ratio increasing from 2.3 to 3.0 staff per primary care provider (PCP) full time equivalent (FTE).[17] The VA hired 1271 primary care RN Care Managers (RNCMs) between January 2010 and December 2011 to fulfill the roles of chronic illness management, panel management of high-risk patients, and facilitation of patient care transitions.[17]

Personnel perspectives of PCMH implementation and outcomes

Two recent reviews of the PCMH literature report that the medical home is associated with small to moderate improvements in primary care settings.[18,19] The model is reported to have a small positive effect on patient experiences of care and a small to moderate positive effect on

preventative care services.[18] PCMHs are generally shown to be associated with improvements in patient-reported coordination of care.[18] A number of studies have also attributed small improvements in primary care clinical staff satisfaction to the medical home model.[18]

Despite the widespread interest in the PCMH model and reports of small to moderate improvements in some areas of primary care, there is a lack of data regarding which medical home components are most important for improvement in care.[18,19] Additionally, although the medical home has been associated with improved patient satisfaction and service utilization, results are mixed in terms of the relationship between PCMH and downstream quality outcomes.[19]

There are several important methodological limitations to the current literature. First, most studies do not directly measure specific PCMH components.[19] Instead, they compare sites that are implementing a PCMH model to sites that are not[12,20] or rely on measures such as patient perceptions of their exposure to medical home components, e.g., follow-up by clinical team members.[19] As a result of these methods, it is difficult to compare PCMH models between initiatives and the degree of implementation is generally unknown.[19] Second, most PCMH studies have only assessed implementation and outcomes from the physician perspective, not among other team members.[19] This is particularly important because PCMH is a team-based model of care. Third and finally, PCMH is implemented at a clinic level and testing associations between medical home elements and outcomes depends on having sufficient numbers of clinics to compare. Most demonstrations and studies have included few clinics, limiting their power to detect differences among sites. The implementation of the VA PACT program nationally offers a unique opportunity to study the association of specific elements of a PCMH model with improvements in quality of care and other outcomes.

Early findings from the PACT evaluation

Early findings suggest that PACT implementation has resulted in significant changes to VA primary care. Interrupted time series' found increases in phone encounters (2.7 to 28.8/100 patients/quarter, $p<0.01$), electronic messaging to providers (0.01% to 2.3% of patients messaging/quarter), and post-hospitalization follow-up (6.6% to 61% of VA hospital discharges) between January 2010 and December 2011.[17] Over the same period there was a simultaneous decline in PCP visit rates (53 to 43 visits per 100 patients per quarter, p trend <0.01).[17]

Preliminary descriptive findings from a national survey of VA primary care personnel, the 2012 PACT Primary Care Personnel Survey, suggest variation in the extent of implementation of specific components of PACT and differences in the level of improvement in patient-centered care perceived by VA personnel. For example, across a range of clinical tasks such as assessing lifestyle factors and encouraging lifestyle modifications, only two-thirds of nurse care managers and clinical staff assistants report that their teamlets rely on them a great deal.[21] When asked how much improvement they have seen in delivery of optimal patient-centered care since the beginning of PACT, 25.9% of nurse care managers and 19% of primary care providers (PCPs) report "much" or "a lot" of improvement in patient centered care.[22] As of yet, no analyses have been conducted to determine which, if any, PACT components are associated with these personnel-perceived improvements in patient-centered care and whether primary care respondents from different occupations report the same associations.

Objective and aims:

The objective of the current study is to describe the relationship between PACT components and personnel-reported improvements in care, and the variation of this relationship across occupation types, using data from the 2012 PACT Personnel Survey. Figure 1 displays a

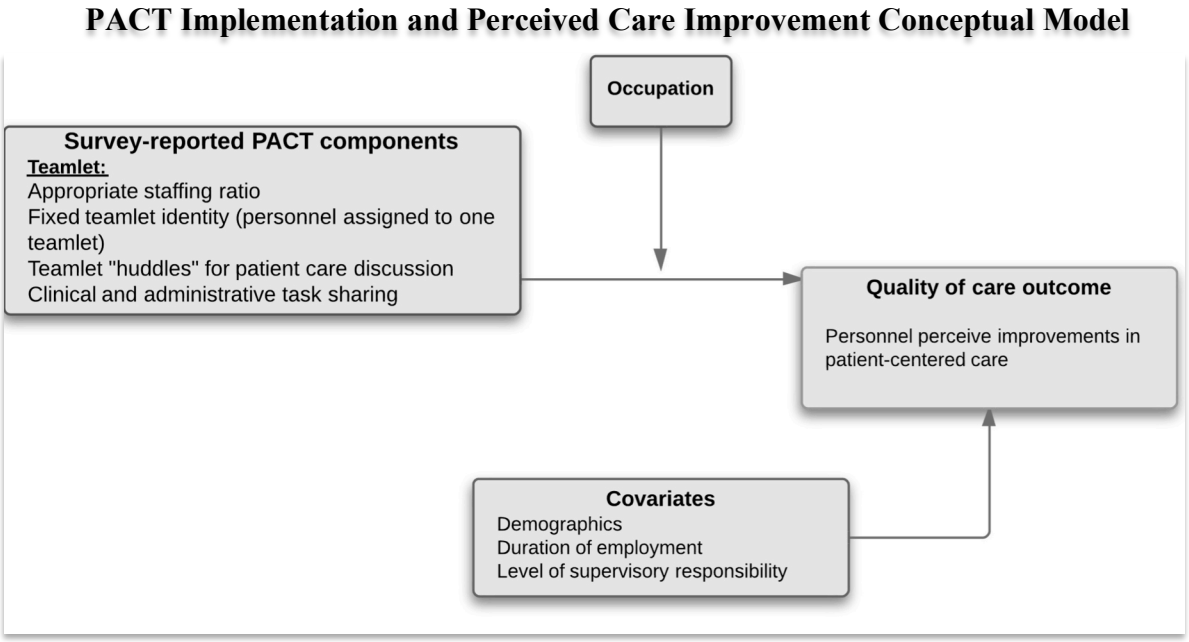


Figure 1: Conceptual model of the relationships between PACT components, personnel occupation, demographics and employment factors.

conceptual model characterizing the relationship between PACT components, which include teamlet staffing ratio, assignment to one or more teamlets, time spent in teamlet huddles, and clinical and administrative task sharing, and the outcome of interest, personnel-reported improvements in patient-centered care since becoming aware of PACT. Occupation is considered as an effect modifier of the relationship between the independent variables, PACT components, and dependent variable, while demographic and employment factors are shown and investigated as covariates.

The specific aims of this study are twofold. First, this study aims to test the correlation between perceived improvements in patient-centered care with PACT implementation indicators among primary care personnel with the expectation that self-reported implementation of core PACT-components in VA primary care clinics will be positively associated with higher levels of

self-reported improvement in patient-centered care. Second, this study aims to explore how correlations between PACT component implementation and perceived care quality improvement differ across respondents' occupation (PCP, nurse care manager, clinical staff assistant, and administrative staff member) through stratified analysis.

Methods:

Setting: The Veterans Health Administration (VA) provides primary care to over 5 million patients annually through 900 clinics within the largest integrated health care delivery system in the United States.[16] Although the panel sizes of VA primary care providers are often smaller than the national average, ranging from 900-1,500 patients depending upon the severity of their diseases and the resource available,[16] VA patients tend to be sicker, older, and have lower incomes than the general population.[22] More than 44% of the patients that the VA serves are 65 and older, while chronic conditions like hyperlipidemia, hypertension and diabetes are significantly more prevalent than in the general population.[16]

Design: The data for this study are drawn from the 2012 PACT Primary Care Personnel Survey, a nationwide survey of all VA primary care personnel, excluding sites participating in the VISN 20 and VISN 22 PACT Demonstration Laboratories. Veterans Integrated Service Networks (VISN) are regional networks overseen by an executive team that serve as the primary administrative divisions for organizing and managing health care services in the VA. This survey was conducted in May and June 2012, approximately two years after the official launch of the PACT initiative in VA primary care clinics (April 2010). The survey assessed staff perceptions of implementation of PACT program components, team functioning, barriers to delivering patient-centered care and respondent perspectives on whether patient centered care has improved since PACT began.

Sample: There were 6,467 respondents to the 2012 survey from clinics affiliated with 142 VA medical centers (of approximately 153 nationally). The survey was distributed by each medical center Chief Medical Officer via clinical leadership in primary care, nursing, social work and other service lines and intended to reach a census of primary care personnel, including providers, nurse care managers, clinical staff assistants, administrative staff, and other primary care-based clinicians including mental health providers, clinical pharmacists, and nutritionists. The present study analyses are conducted on data from the 4,819 respondents in occupations comprising the core care team, or teamlet: primary care providers, nurse care managers, clinical staff assistants, and administrative staff.[15] This study excludes respondents in nurse occupation categories other than care managers in order to focus on those with the most defined job functions within the teamlet. Individuals in the occupation categories included in the core teamlet but who are not assigned to teamlets are included in this study to provide for investigation of the influence of teamlet assignment and PACT components on non-teamlet perspectives.

Measures: All measures come from the 2012 PACT Primary Care Personnel Survey. The dependent variable is respondent-reported improvement in the provision of patient-centered primary care since becoming aware of PACT, a 6-category variable including "no improvement", "little improvement", "some improvement", "much improvement", "a lot of improvement", and "N/A or don't know" as possible response options. We dichotomize the outcome of this variable by categorizing those reporting either "much" or "a lot" of improvement in patient-centered care since becoming aware of PACT as those reporting improvement. The independent variables for aim 1 are 5 sets of measures of PACT implementation: 1) assignment to a teamlet, 2) whether the respondent is assigned to more than one teamlet, 3) whether teamlet is staffed to the recommended FTE ratio of 3.0 FTE teamlet members for each 1.0 FTE PCP, 4)

whether a teamlet spends more or less than 0.5 hours daily discussing patient care (i.e., teamlet "huddles"), 5) respondent assessment of task sharing among teamlet members in primary care service provision. Respondent demographics, duration of employment, and level of supervisory responsibility are also explored in Aim 1. For Aim 2, respondent occupation is used in stratified analyses.

Statistical Analysis**:** Basic frequencies were calculated for descriptive analysis. Aims 1 and 2 were investigated using bivariate comparisons testing for significance using a Chi-square test. All p-values are based on two-sided tests. For Aim 1 measures of PACT implementation are investigated for association with perceived improvements in quality of patient-centered care with respondent demographics, durations of employment and level of supervisory responsibility investigated as potential confounding variables. For Aim 2 the relationships between independent and dependent variables are stratified by the four occupation categories set out in the teamlet model. P-values are analyzed based on a 5% probability of type I error.

Results:

Table 1 displays respondent demographics both overall and stratified by occupation. The study sample is heterogeneous in terms of age, race, tenure (duration of employment), and level of supervisory responsibility (Table 1). The population is made of 36.7% PCPs (n=1769), 23.6% nurse care managers (n=1135), 28.2% clinical staff assistants (n=1358) and 11.6% administrative staff (n=557). The vast majority (82.8%) of personnel have been employed for two years or more, meaning they have been employed prior to the initiation of PACT. Respondent age, ethnicity, duration of VA employment and supervisory level all differ significantly among occupations, with a higher proportion of PCPs, relative to other occupations, being male and having supervisory responsibility.

TABLE 1 Respondent Characteristics

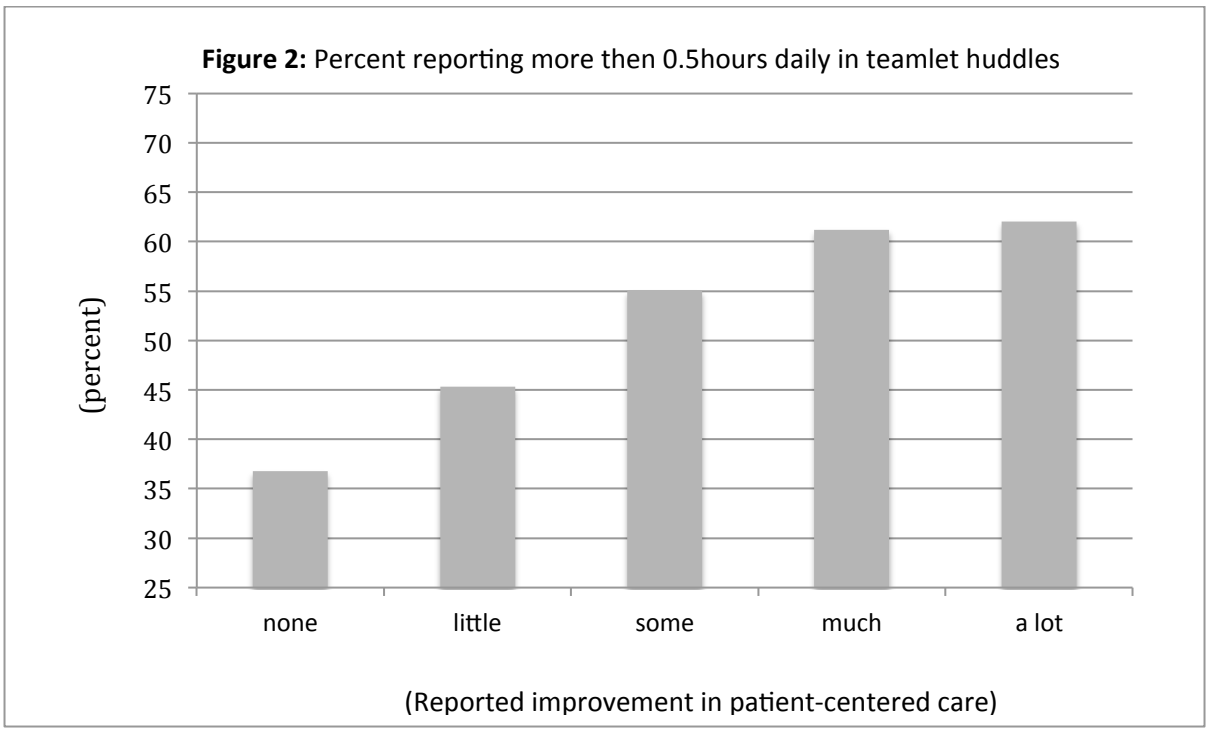
Category	Characteristic	n	%	PCP (n=1769)	Nurse Care Manager (n=1135)	Clinical Staff Assistants (n=1358)	Admin. Staff (n=557)	Overall category p-value *
Gender	Female	3347	73.3	55.8	89.5	84.1	68.7	p<0.001
Age	less than 20 yrs	11	0.3	0.1	0.1	0.3	0.8	p<0.001
	20-29 yrs	130	2.9	0.3	3.1	4.6	6.3	
	30-39 yrs	726	16.2	13.2	13.4	20.4	21.3	
	40-49 yrs	1313	29.4	28.6	28.7	30.7	29.9	
	50-59 yrs	1715	38.3	40.3	43.8	34.1	31.6	
	60 yrs or older	579	12.9	17.5	10.9	10.0	10.1	
Ethnicity	Hispanic/ Latino	308	7.2	5.8	5.8	8.6	10.9	p<0.001
	White	3184	71.8	70.9	75.5	71.0	69.0	
	Black/ African American	481	10.9	3.8	10.7	16.2	20.3	
Duration of VA employment	less than 6 months	126	2.8	1.8	1.8	4.5	4.0	p<0.001
	6mo-1yr	216	4.8	4.3	2.6	6.5	6.5	
	1yr-2yrs	439	9.7	5.8	11.0	12.9	11.6	
	2yrs-5yrs	1082	23.9	22.9	22.7	25.8	24.9	
	5yrs-10yrs	986	21.8	24.8	20.9	19.5	19.5	
	10yrs-15yrs	714	15.8	19.2	13.4	14.2	13.5	
	15yrs-20yrs	378	8.4	9.6	8.5	7.1	7.0	
	more than 20 yrs	588	13.0	11.6	19.0	9.6	13.1	
Level of supervisory responsibility	None	2863	62.7	46.0	44.0	93.2	79.3	p<0.001
	Team Leader	1394	30.5	41.5	51.6	6.1	12.8	
	First Line Supervisor	165	3.6	6.8	2.0	0.4	4.7	
	Manager	121	2.7	4.8	2.1	0.2	3.0	
	Executive	13	0.3	0.7	0.0	0.1	0.0	
	Senior Executive	8	0.2	0.1	0.4	0.1	0.2	
Occupation	PCP	1769	36.7					p<0.001
	Nurse Care Manager	1135	23.6					
	Clinical Staff	1358	28.2					

Assistants		
Admin. Staff	557	11.6

*p-value is for Chi-square test of differences in proportions between category subdivisions

Table 2 shows independent and dependent variable frequencies both overall and stratified by occupation. Overall, 24.6% of respondents in the sample report improvement in patient-centered care since becoming aware of PACT (defined as those reporting “much” or “a lot” of improvement). Overall 88.6% of respondents report being assigned to a teamlet, and 32.8% report being assigned to more than one teamlet. The variation in the proportion of each occupation that is assigned to more than one teamlet is significant ($p<0.001$) with more than half of administrative staff (54%) and only 17.6% of PCPs assigned to multiple teamlets. The proportion of clinical staff assistants (39.1%) and nurse care managers (40.3%) on more than one teamlet fall in between the two. Both independent and dependent variable frequencies differ by occupation.

Overall, half (50.4%) of respondents report that their teamlets are staffed appropriately (Table 2). The median time spent in teamlet huddles daily among those reporting “no improvement” and “little improvement” was 0.25 hours, whereas the median time spent in huddles was 0.5 hours daily for those reporting “some”, “much” or “a lot” of improvement. As a result, 0.5 hours was used as a cutoff in the comparison of those spending enough and potentially not enough time in daily teamlet huddles. Figure 2 displays that the higher the level of reported improvement the larger the proportion of personnel reporting more than 0.5 hours in huddles daily.



The following types of task sharing/delegation activities were reported as delegated the least often within this sample (defined as less than 50% reporting the task is delegated to non-provider team members "somewhat" or "a great deal") (Table 2):

- Completing forms for patients
- Responding to home health care requests
- Responding to diagnostic and treatment data
- Following up on referrals

The following types of task sharing/delegation are delegated at a moderate level (defined as having 50-65%of personnel responding either "somewhat" or "a great deal") (Table 2):

- Evaluating patients/making treatment decisions
- Tracking diagnostic data

The following types of task sharing/delegation have moderate to high delegation (defined as 65-80% of personnel responding either "somewhat" or "a great deal") (Table 2):

- Gathering preventative service utilization
- Screening for disease
- Responding to refill requests

- Assessing lifestyle factors
- Encouraging lifestyle modifications
- Educating patients about disease
- Educating patients about medications

The following types of task sharing/delegation are in the high delegation category (with 80-100% of personnel responding either "somewhat" or "a great deal") (Table 2):

- Receiving messages from patients
- Resolving messages from patients

TABLE 2 Independent and Dependent Variable Frequencies

Variable	Values	n	%	PCP (n=1769)	Nurse Care Manager (n=1135)	Clinical Staff Assistants (n=1358)	Admin. Staff (n=557)	Overall category p-value*
Reported improvement in delivery of patient-centered care	None	752	15.6	20.2	12.2	13.8	12.4	p<0.001
	Little	1028	21.3	23.0	21.9	18.8	21.0	
	Some	1583	32.9	32.5	36.2	31.4	30.5	
	Much	785	16.3	13.1	17.4	18.9	18.0	
	A lot	402	8.3	6.4	8.6	10.2	9.7	
	N/A or don't know	269	5.6	4.9	3.8	6.9	8.4	
On a teamlet	Yes	4270	88.6	90.6	94.0	87.5	74.2	p<0.001
On multiple teamlets	Yes	1400	32.8	17.6	40.3	39.1	54.0	p<0.001
Teamlet staffed appropriately	Yes	2152	50.4	43.5	48.4	57.8	61.0	p<0.001
Percent reporting ≥0.5 hours in teamlet huddles daily		2451	50.9	43.6	62.3	53.8	43.6	p<0.001

Task Delegation variables								
Gathering preventative service utilization	Not at all	748	15.5	12.6	7.1	9.7	56.0	p<0.001
	Slightly	663	13.8	18.4	16.7	5.2	14.0	
	Somewhat	1112	23.1	26.3	30.0	17.6	12.0	
	A great deal	2296	47.6	42.7	46.2	67.5	18.0	
Screening for disease	Not at all	737	15.3	6.1	4.1	10.5	79.0	p<0.001
	Slightly	487	10.1	13.8	14.9	3.5	4.7	
	Somewhat	1020	21.2	30.5	25.9	11.6	5.2	
	A great deal	2575	53.4	49.6	55.1	74.4	11.1	
Responding to refill requests	Not at all	673	14.0	18.0	3.1	12.5	26.9	p<0.001
	Slightly	609	12.6	16.1	7.8	12.2	12.4	
	Somewhat	1122	23.3	26.4	21.7	23.2	16.9	
	A great deal	2415	50.1	39.5	67.4	52.1	43.8	
Receiving messages from patients	Not at all	207	4.3	4.2	1.7	4.7	9.0	p<0.001
	Slightly	382	7.9	11.3	2.6	8.6	6.5	
	Somewhat	978	20.3	25.8	9.1	24.5	15.4	
	A great deal	3252	67.5	58.7	86.6	62.2	69.1	
Resolving Messages from patients	Not at all	265	5.5	6.3	1.5	5.2	11.9	p<0.001
	Slightly	500	10.4	15.7	2.6	9.6	11.5	
	Somewhat	1208	25.1	33.3	8.4	27.9	26.0	
	A great deal	2846	59.1	44.7	87.6	57.4	50.6	
Evaluating patients/making treatment decisions	Not at all	1382	28.7	23.6	5.0	34.5	78.6	p<0.001
	Slightly	912	18.9	27.4	9.5	21.4	5.0	
	Somewhat	1124	23.3	26.3	29.0	22.5	4.1	
	A great deal	1401	29.1	22.6	56.5	21.5	12.2	
Assessing lifestyle factors	Not at all	793	16.5	9.2	1.8	11.7	81.0	p<0.001
	Slightly	525	10.9	18.0	7.8	6.8	4.9	
	Somewhat	1180	24.5	35.7	24.4	18.6	3.4	
	A great deal	2321	48.2	37.1	66.1	62.9	10.8	
Encouraging Lifestyle Modifications	Not at all	716	14.9	9.4	1.2	8.0	77.0	p<0.001
	Slightly	554	11.5	18.9	5.8	8.0	8.1	
	Somewhat	1267	26.3	37.7	22.1	23.4	5.8	
	A great deal	2282	47.4	34.1	70.9	60.6	9.2	
Educating	Not at all	833	17.3	11.6	1.3	11.6	81.9	p<0.001

patients about disease-specific self care	Slightly	575	11.9	20.5	5.2	9.1	5.4	
	Somewhat	1175	24.4	34.7	18.7	24.3	3.4	
	A great deal	2236	46.4	33.2	74.8	55.0	9.3	
Educating patients about medications	Not at all	917	19.0	14.8	1.6	15.2	77.2	p<0.001
	Slightly	752	15.6	25.7	5.8	13.9	7.5	
	Somewhat	1258	26.1	32.7	24.0	27.6	5.8	
	A great deal	1892	39.3	26.7	68.6	43.2	9.5	
Completing forms for patients	Not at all	1914	39.7	51.3	21.5	38.4	39.7	p<0.001
	Slightly	956	19.8	17.9	22.6	20.3	19.8	
	Somewhat	965	20.0	13.9	29.9	21.3	20.0	
	A great deal	984	20.4	16.9	26.0	20.1	20.4	
Responding to home health care requests	Not at all	1696	35.2	37.1	9.6	41.6	65.5	p<0.001
	Slightly	967	20.1	22.1	20.1	20.9	11.7	
	Somewhat	1020	21.2	19.7	32.5	18.7	8.6	
	A great deal	1136	23.6	21.1	37.8	18.8	14.2	
Tracking diagnostic data	Not at all	1413	29.3	42.1	6.7	21.7	53.3	p<0.001
	Slightly	913	19.0	22.2	13.6	20.3	16.3	
	Somewhat	1136	23.6	16.3	37.4	26.2	12.0	
	A great deal	1357	28.2	19.3	42.4	31.8	18.3	
Responding to diagnostic and treatment data	Not at all	1522	31.6	39.0	7.0	27.5	68.2	p<0.001
	Slightly	909	18.9	24.0	13.3	20.3	10.2	
	Somewhat	1045	21.7	16.7	33.2	24.2	7.7	
	A great deal	1343	27.9	20.2	46.5	28.0	13.8	
Follow-up on referrals	Not at all	1527	31.7	42.7	8.6	38.0	42.9	p<0.001
	Slightly	1049	21.8	23.5	18.6	22.8	20.3	
	Somewhat	1055	21.9	15.2	34.8	22.5	15.4	
	A great deal	1188	24.7	18.7	38.0	22.7	21.4	

*p-value is for Chi-square test of differences in proportions between category subdivisions

Table 3 displays the proportion of respondents reporting much or a lot of improvement in patient centered care, by respondent demographics overall and stratified by occupation. Table 3 has two p-value columns. The first p-value is for differences in the proportion of overall respondents reporting improvements in patient centered care by demographic category

subdivisions. The second p-value, in the far right column, is for difference in the proportion of respondents reporting improvements in patient-centered care for each demographic category stratified by occupation.

There is a significant difference in the percent of males and females reporting improvement in patient-centered care, 23.1% of men and 26.1% of women (p=0.04, Table 3). Age does not appear to be associated with the perception of patient care improvement in this sample (p=0.85). There appears to be a moderate association between race and reporting of improvement, with the proportion reporting improvement among white personnel almost 10% lower than that of Hispanic/Latino and Black/African American personnel (p<0.001) (Table 3).

The association between tenure category (duration of employment) and reported improvement is also significant (p=0.012) (Table 3). Although statistically significant, the association does not display a direct relationship, as the proportion reporting improvement ranges from 19.8% among those employed less than 6 months to 29.9% among those employed more than 20 years, but 29.8% of those employed only 1-2 years also reported much/a lot of improvement.

There appears to be an association between the level of supervisory responsibility and perceived improvement in patient centered care (p<0.001) (Table 3). The lowest rates of reported improvement overall exist among those with no supervisory responsibility in the sample, with an increase in the percent reporting improvement among team leaders. This finding holds across all occupation categories.

TABLE 3: % of respondents reporting improvement in patient-centered care since becoming aware of PACT, stratified by respondent occupation and demographics/covariates

Category	Characteristic	Overall (%)	PCPs (n=1769)	Nurse Care Managers (n=1135)	Clinical Staff Assistants (n=1358)	Admin. Staff (n=557)	overall category p-value*	inter-occupation p-value†
	Overall	24.6	19.5	25.9	29.1	27.7		p<0.001

Gender	Male	23.1	20.5	23.0	30.2	25.8	p=0.04	p=0.025
	Female	26.1	20.1	26.7	29.7	28.6		p<0.001
Age	less than 20 yrs	18.2	0.0	0.0	25.0	25.0	p=0.854	p=0.821
	20-29 yrs	26.15	50.0	27.3	27.6	18.2		p=0.402
	30-39 yrs	24.7	19.4	24.8	28.40	25.89		p=0.158
	40-49 yrs	25.67	22.3	22.92	30.93	28.03		p=0.018
	50-59 yrs	26.4	20.6	29.1	30.7	30.12		p<0.001
	60 yrs or older	24.0	17.83	28.95	30.16	32.1		p=0.007
Ethnicity	Hispanic/ Latino	33.8	27.5	40.7	38.5	27.8	p<0.001	p=0.190
	Black/African American	33.7	18.0	32.1	38.1	35.9		p=0.032
	White	23.7	18.6	25.9	27.5	26.1		p<0.001
Duration of VA employment	less than 6 mo	19.8	13.8	10.5	26.3	19.1	p=0.012	p=0.360
	6mo-1yr	26.4	18.3	32.1	34.9	17.7		p=0.062
	1yr-2yrs	29.8	25.8	35.9	29.9	24.6		p=0.306
	2yrs-5yrs	25.2	19.7	23.6	30.7	30.5		p=0.003
	5yrs-10yrs	22.8	19.0	21.5	26.9	31.1		p=0.019
	10yrs-15yrs	24.1	20.1	27.3	18.2	25.4		p=0.149
	15yrs-20yrs	23.5	19.4	20.9	30.0	32.4		p=0.132
	more than 20 yrs	29.9	23.8	33.0	34.2	30.4		p=0.146
Level of supervisory responsibility	None	23.7	13.9	24.5	28.7	26.1	p<0.001	p<0.001
	Team Leader	26.0	22.1	26.9	44.9	36.8		p<0.001
	First Line Supervisor	29.7	29.8	33.3	20.0	28.0		p=0.942
	Manager	45.5	44.4	50.0	50.0	43.8		p=0.969
	Executive	38.5	41.7		0.0			p=0.411
	Senior Executive	12.5	0.0	25.0	0.0	0.0		p=0.767

*p-value is for Chi-square test of differences in proportions between category subdivisions
† p-value is for Chi-square test of differences in proportions among occupations

Table 4 displays the proportion of respondents reporting much or a lot of improvement in patient centered care, by independent variable and stratified by occupation. Table 4 has two p-value columns. The first p-value is for differences in the proportion of overall respondents

reporting improvements in patient centered care across independent variable subdivisions; this addresses specific aim 1. The second p-value, listed in the far right column, is for difference in the proportion of respondents reporting improvements in patient-centered care for each independent variable subdivision stratified by occupation; this addresses specific aim 2.

Being assigned to a teamlet is associated with an increased likelihood of reporting improvement in patient-centered care, with 25.6% of those on a teamlet compared to 15.9% of those not on a teamlet reporting improvement ($p<0.001$) (Table 4). This association seems to be strongest among PCPs (20.5% on teamlet, 8.4% not on a teamlet) and clinical staff assistants (31.0% on teamlet, 14.1% not on a teamlet) and is almost absent among administrative assistants (28.6% on a teamlet, 29.7% not on a teamlet, $p<0.001$).

TABLE 4: % of respondents reporting improvement in patient-centered care since becoming aware of PACT, stratified by occupation and independent variables

Variable	Value	Overall (%)	PCPs (n=344)	Nurse Care Manager (n=1135)	Clinical Staff Assistants (n=1358)	Admin. Staff (n=557)	Overall category p-value *	Inter-occupation p-value†
On a teamlet	Yes	25.6	20.5	26.2	31.0	28.6	p<0.001	p<0.001
	No/Not sure	15.9	8.4	23.1	14.1	29.7		p=0.001
On multiple teamlets	Yes	29.3	23.1	28.6	32.5	31.8	p<0.001	p=0.039
	No/Not sure	23.8	19.9	24.5	30.0	24.7		p<0.001
Teamlet staffed appropriately (3.0 FTE)	Yes	33.0	29.1	21.6	37.1	35.3	p<0.001	p=0.011
	No/Not sure	18.1	13.8	21.1	22.6	18.0		p<0.001
Spending at least 0.5 hrs in huddles	Yes	30.0	25.0	27.9	34.9	37.0	p<0.001	p<0.001
	No/Not sure	19.1	15.1	22.7	22.3	29.4		p<0.001
Gathering preventative service utilization	Not at all	18.1	9.0	18.5	21.2	23.1	p<0.001	p<0.001

	Slightly	21.0	16.6	27.5	21.1	23.1		p=0.032
	Somewhat	21.8	16.1	26.1	22.6	35.8		p<0.001
	A great deal	29.2	25.8	26.3	32.5	40.0		p=0.001
Screening for disease	Not at all	22.7	5.6	21.3	22.5	27.1	p<0.001	p<0.001
	Slightly	17.9	11.5	24.9	27.1	15.4		p=0.002
	Somewhat	22.4	18.4	25.9	28.5	27.6		p=0.012
	A great deal	27.4	24.0	26.6	30.2	37.1		p=0.007
Responding to refill requests	Not at all	18.7	10.4	14.3	27.1	28.0	p<0.001	p<0.001
	Slightly	21.7	12.6	25.8	31.3	30.4		p<0.001
	Somewhat	24.1	20.8	24.4	27.9	26.6		p=0.127
	A great deal	27.3	25.5	26.9	29.6	27.1		p=0.381
Receiving messages from patients	Not at all	16.9	5.4	15.8	18.8	32.0	p<0.001	p=0.002
	Slightly	13.4	7.0	10.0	22.2	22.2		p=0.001
	Somewhat	22.1	17.3	17.5	29.8	23.3		p<0.001
	A great deal	27.2	23.8	27.5	30.5	28.6		p=0.01
Resolving messages from patients	Not at all	14.0	5.4	17.7	18.6	22.7	p<0.001	p=0.006
	Slightly	15.6	10.8	3.5	26.9	18.8		p<0.001
	Somewhat	23.6	18.9	22.1	29.8	27.6		p=0.001
	A great deal	27.7	24.9	27.1	30.0	30.9		p=0.078
Evaluating patients/making treatment decisions	Not at all	22.1	9.8	22.8	28.8	26.5	p<0.001	p<0.001
	Slightly	20.0	16.7	20.4	25.1	21.4		p=0.045
	Somewhat	25.0	23.6	24.3	27.1	34.8		p=0.48
	A great deal	29.9	28.0	27.9	35.6	35.3		p=0.061
Assessing lifestyle factors	Not at all	21.9	4.9	20.0	26.4	26.6	p<0.001	p<0.001
	Slightly	15.4	11.0	15.9	26.1	29.6		p=0.001
	Somewhat	21.7	20.3	22.4	24.9	15.8		p=0.434
	A great deal	29.1	26.3	28.5	31.2	38.3		p=0.080
Encouraging lifestyle modifications	Not at all	20.5	6.0	30.8	18.5	26.3	p<0.001	p<0.001

	Slightly	14.6	9.9	15.2	25.7	22.2		p<0.001
	Somewhat	20.6	19.4	16.7	25.5	28.1		p=0.035
	A great deal	30.6	28.5	29.6	32.3	43.1		p=0.088
Educating patients about disease-specific self-care activities	Not at all	19.8	5.4	20.0	21.7	25.7	p<0.001	p<0.001
	Slightly	16.7	14.9	11.9	21.0	30.0		p=0.064
	Somewhat	22.1	18.1	20.3	30.3	31.6		p<0.001
	A great deal	29.8	28.6	28.4	31.5	42.3		p=0.106
Educating patients about medications	Not at all	19.2	5.3	16.7	22.7	26.1	p<0.001	p<0.001
	Slightly	17.8	16.0	12.1	22.8	23.8		p=0.085
	Somewhat	22.4	19.2	21.3	28.0	25.0		p=0.015
	A great deal	31.5	30.9	28.9	34.1	45.3		p=0.029
Completing forms for patients	Not at all	21.1	15.1	23.0	27.8	27.4	p<0.001	p<0.001
	Slightly	25.3	25.6	24.5	26.6	23.4		p=0.912
	Somewhat	25.9	20.4	23.9	32.2	28.3		p=0.013
	A great deal	29.6	25.4	31.9	30.8	31.6		p=0.302
Responding to Home Health Care requests	Not at all	20.8	11.4	19.3	27.4	28.0	p<0.001	p<0.001
	Slightly	23.2	20.0	23.3	28.9	16.9		p=0.032
	Somewhat	26.6	24.1	26.3	30.3	27.1		p=0.397
	A great deal	29.8	28.7	28.7	31.8	35.4		p=0.541
Tracking diagnostic data	Not at all	17.6	12.5	14.5	22.0	26.9	p<0.001	p<0.001
	Slightly	23.7	22.7	18.2	29.1	20.9		p=0.054
	Somewhat	25.9	23.9	25.0	28.7	25.4		p=0.530
	A great deal	31.5	27.2	31.0	34.3	37.3		p=0.108
Responding to diagnostic and treatment data	Not at all	20.0	12.6	22.8	26.8	26.3	p<0.001	p<0.001
	Slightly	22.6	20.0	21.9	27.5	19.3		p=0.117
	Somewhat	25.9	26.0	24.4	27.7	25.6		p=0.808
	A great deal	30.2	26.5	28.6	33.7	41.6		p=0.020

Follow-up on referrals	Not at all	19.2	12.7	18.4	26.5	27.6	p<0.001	p<0.001
	Slightly	23.7	22.7	20.4	27.7	23.0		p=0.225
	Somewhat	25.8	23.1	25.8	28.8	23.3		p=0.443
	A great deal	31.2	27.9	30.4	34.4	35.3		p=0.237

*p-value is for Chi-square test of differences in proportions between category subdivisions
† p-value is for Chi-square test of differences in proportions among occupations

Being assigned to more than one teamlet was significantly associated with an increased perception of improvement in care (29.3% among those on more than one teamlet, 23.8% among those not on more than one teamlet or unsure if they are, $p<0.001$). This association holds across all occupation categories (Table 4).

Personnel on teamlets that are staffed appropriately are more likely to report improvement than those who are on teamlets that are not staffed according to the 3.0FTE ratio (33.0% among those with teamlets staffed at 3.0FTE and 18.1% among those on teamlets not staffed at 3.0FTE or who are unsure, $p<0.001$) (Table 4). This effect appears to be absent, however, for nurse care managers (21.6% report improvement among those on teamlets staffed appropriately and 21.1% among those on teamlets not staffed at 3.0 FTE).

Spending at least 0.5 hours daily in teamlet huddles daily is associated with reported improvement in patient-centered care ($p<0.001$)(Table 4). The proportion of personnel reporting improvement who spend at least 0.5 hours daily in team huddles is 30.0% compared to only 19.1% of those reporting less than 0.5 hours daily ($p<0.001$).

Although each delegation task from the survey is significant for an association with increased reporting of improvement in patient-centered care ($p<0.001$), the delegation activities that have the strongest associations are (Table 4):

- Gathering preventative service utilization (11.2% difference in reporting improvement between “not at all” and “a great deal”, $p<0.001$).

- Receiving messages from patients (10.3% difference in reporting improvement between "not at all" and "a great deal", $p<0.001$).

For nurse care managers, the relationship between reported improvement in care and increased sharing of a delegation task is weaker or even opposite than the relationships seen for PCPs and clinical staff assistants in many of the delegation categories (Table 4). Additionally, in many of the delegation categories a lower proportion of nurse care managers, clinical staff assistants and administrative staff report improvement in the intermediate categories of task delegation than in the "not at all" or "a great deal" categories. For example, in the "receiving messages from patients" category in Table 4 under the column for administrative assistants, a higher proportion of administrative staff who responded "not at all" and " a great deal" reported improvement than those who responded " slightly" and "somewhat".

Discussion:

As anticipated, there is largely a positive association between the level of implementation of PACT components, as characterized by the study elements described here from the 2012 PACT Personnel Survey, and personnel-reported improvements in patient-centered care. This relationship largely held across occupations, with some important exceptions including the absence of a relationships between teamlet assignment and perceived improvement for administrative staff; the absence of a relationship between appropriate teamlet staffing and reported improvement for nurse care managers; and the association of improvement with delegation of the "encouraging lifestyle modifications" task for nurse care managers. While the associations between PACT components and reported improvement were positive, there are statistically significant differences in the strength of the observed associations across the four teamlet occupation categories, with some variation appearing to correlate with differences in clinical or leadership roles.

The fact that the vast majority of personnel in this study population have been employed at the VA for more than two years, the approximate duration of the PACT program at the time that the survey was conducted, suggests that these reported improvements in patient-centered care are largely in comparison to pre-PACT primary care quality.

According to the criteria set out in this study for patient-centered care improvement (defined by reporting that there has been "much" or "a lot" of improvement in patient centered care since becoming aware of PACT) the majority of personnel (69.8%) do not believe there has been significant improvement. PCPs are the least likely to report that there has been improvement, a finding that is not explained by the information captured in this study. A possible explanation for this finding, which is as of yet not supported by evidence in the VA, may be that changes in traditional provider roles that come with the medical home model could represent a challenge for providers

Being assigned to a teamlet is generally associated with perceived improvement in patient-centered care, although not for administrative staff. This may have to do with the largely clinical function of the teamlet and the more administrative and system-level work done by administrative staff. Surprisingly, being assigned to more than one teamlet is also associated with an increase in reported improvement. PCPs are the least likely to be assigned to more than one teamlet while administrative staff are the most likely, with over half of administrative staff reporting being assigned to more than one. This finding, that being assigned to more than one teamlet is associated with reported improvement, could hypothetically be a result of the broader view of PACT-related changes that being assigned to more than one teamlet would provide any given person. If an individual is on more than one teamlet and some teamlets are functioning better or implementing PACT more thoroughly than others, those that are on more than one

teamlet could be more likely to be a part of at least one high functioning team and thus report more improvement.

Being a part of teamlet that is staffed according to the ideal 3.0 FTE ratio is associated with reported improvement in patient-centered care, with the exception of for nurse care managers. One potential hypothesis for this difference could be that given the defined role described previously of nurse care managers, to manage chronic illness, do panel management of high-risk patients, and facilitate patient care transitions[17] their experience of PACT does not vary as significantly with changing staffing ratios as other occupations.

While the optimal time to spend in team huddles likely varies by team (e.g., as a function of how long they've worked together, the individuals' experience, how dynamic the work environment is), there is a strong relationship between the proportion of personnel reporting spending more than 0.5 hours in teamlet huddles and reported improvement in care (the higher the level of reported improvement the larger the proportion of personnel reporting more than 0.5 hours in huddles daily) suggesting that spending at least 30 minutes daily in huddles may be an important threshold for primary care teams to function well.

The delegation of clinical and administrative tasks to non-providers in the clinical team broadly appears to have a strong association with the perception of patient-centered care improvement. This is particularly true for PCPs. When stratified by occupation, a number of delegation categories showed a lower proportion of personnel reporting improvement within the "slightly" or "somewhat" categories of task delegation as compared to both the "not at all" and "a great deal" categories of delegation among nurse care managers, clinical staff assistants and administrative staff. One hypothesis for this finding is that the being relied on slightly or somewhat represents uncertainty about who is responsible for a task, relative to not being relied

on at all or a great deal. It may be that the certainty about team roles is the important factor. This hypothesis is echoed in PACT Demonstration Laboratory qualitative interviews that have found frustration among team members in how tasks are coordinated and communicated. This is an area that may benefit from further investigation through additional studies and qualitative interviews in VA Demonstration Laboratories.

It is unlikely that the described associations between PACT components (e.g., teamlet assignment, the number of teamlets someone is assigned to, teamlet staffing ratio, time spent in huddles, and task delegation) and perceived improvement in patient centered care are due to demographic factors or tenure. Age, race, and tenure are not associated with reported improvement in patient centered care. Supervisory responsibility does show some association with reported improvement, with a higher proportion of team leaders reporting improvement than those with no supervisory responsibility across all occupation categories. It is possible this could be due to a greater ability to perceive improvements in care as a result of the broader access to information (e.g., hearing the perspectives of individuals they supervise, or observing performance data across multiple teams) that those in supervisory roles likely have in comparison to non-supervisors. If this were the case, supervisors may perceive true changes in quality of care related to PACT that non-supervisors are unable to observe. The association between supervisory responsibility and reported improvement could also, however, be due to bias. Those in supervisory roles may feel greater responsibility for demonstrating improvements related to the PACT program and thus be biased in favor of reporting improvements in patient-centered care.

Interpretation:

This thesis makes several contributions to the current body of research on the patient-centered medical home. First, the current literature on the association of PCMH models with outcomes has found mixed and inconsistent results, with limited evidence available of the relationship of specific components of PCMH models with outcomes.[18,19,23] This thesis fills this gap by examining specific changes in team care that were implemented as part of PACT and their association with personnel perceived improvements in patient-centered care.

Second, these findings are important because they may have clearer operational implications than existing downstream outcome measure and can help guide future interventional research to make directed improvements in PCMH models. For example, it appears to be possible to make improvements in quality of patient-centered care irrespective of being assigned to more than one team. But despite this fact, 3.0 FTE ratios on each core care team may be important for improving care. Additionally, spending more than 30 minutes daily in huddles for patient care discussion may also be important.

Finally, as the PCMH model relies upon the delegation of clinical and administrative tasks to various team members for improved efficiency, quality, and cost, and as this study indicates the allocation of tasks to team members is variable in VA primary care, task sharing represents a PCMH component with clear room for improvement in PACT. Additionally, this thesis displays that clarity in clinical and administrative task delegation, in terms of knowing which tasks a team member is definitely or definitely not responsible for in the clinical setting, may be crucial for PCMH team function and improved care. Evidence from current medical home pilots suggests that the time, logistic support, and financial resources needed to achieve PCMH implementation are extensive and vary greatly across practices.[21] In order to focus

limited financial allocations and logistic efforts within practices to capitalize upon the PCMH components which are the most valuable for improving patient care, studies like this one must define what those factors are. The PACT components that are identified in this study as associated with personnel-perceived improvements in patient care can be tested in future PCMH implementation projects for just this purpose.

Although the end goal of patient-centered care improvement requires ongoing assessment of patient experiences and outcomes, process measures and personnel perspectives of care quality provide insight for guiding evaluations in the interim. One of the concerns with existing assessments of patient-centered medical home models, however, is that that they focus exclusively on the physician perspective, and ignore the perspectives of nurses and other primary care team members.[19] Prior research suggests physicians and nurses perceive workplace culture differently[24] and weight criteria differently when assessing quality of care[25] and thus suggest that the physician perspective is unlikely to be a complete one. This study contributes to the literature by explicitly exploring the perspectives of non-physician team members to create a comprehensive picture of PACT program implementation and outcomes. This thesis displays that within the VA primary care setting, different members of the care team do indeed perceive clinical tasks and quality of care differently. Given the variation between occupations, particularly for nurse care managers and administrative staff, of the relationships between PACT components and reported care improvements it is clear that future studies into appropriate sharing of clinical and administrative tasks must take into account the specific training, job functions, and needs of different professions.

Limitations:

There are four primary limitations to this research. First, there may be sampling or selection bias due to the sampling method that was used for the administration of the 2012 PACT Primary Care Personnel Survey, in which clinic leadership was responsible for survey distribution. It is possible that the survey was not provided to all intended clinic personnel, and in the case that this occurred, it would be unlikely that individuals were excluded at random.

Second, these analyses are cross-sectional and limited to data from a single data source. The anonymity of PACT surveys prevents pairing of this survey data with previously acquired survey data to assess changes in PACT program implementation and perceived outcomes over time. Because PACT was implemented nationally in VA primary care clinics, there are no control clinics. Both the independent and dependent variables are self-reported in this study, and both measured using the same survey instrument. In particular, self-reported outcomes may be subject to bias, and measuring both independent and dependent variables simultaneously introduces the threat of method bias (i.e., spurious correlations arising from the common method).[26]

Third, the primary outcome, changes in perceived quality of care, are reported by primary care personnel, not patients or objective measures. There may be leniency bias in self-reported quality of patient-centered care. However, compared to patients, who have limited and varied contact with the many layers of the medical home system of care, personnel working in primary care clinics may be in a better position to observe the components of PCMHs, such as PACT, in practice. Research suggests that some cases physician perspectives on medical care may be better predictors of quality than those of patients[27,28,29] and thus may be able to offer more productive insight into care processes and changes.

Finally, findings from these analyses only represent VA primary care settings. Although the primary purpose for these data will be to improve the PACT program and VA primary care, there may be implications for other Patient Centered Medical Home programs. As the reimbursement structures, hiring protocols, patient populations, electronic health infrastructure and other various characteristics vary greatly between this and other care provision systems, it is not known whether these findings will generalize to other healthcare organizations.

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