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Does expanded state scope of practice for nurse practitioners and physician assistants increase primary care utilization in community health centers?

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ABSTRACT

Background and purpose: Expanding state scope of practice (SOP) for nurse practitioners (NPs) and physician assistants (PAs) can boost productivity and improve access to health care services. Existing analyses on regulatory policies in NP or PA SOP have primarily focused on the direct effects on their own professions but have not fully considered the potential cross-professional effects. This study examines the impact of expanded state SOP for NPs and PAs on primary care utilization by NP, PA, and primary care physician (PCP) in community health centers (CHCs).

Methods: We conducted a difference-in-differences approach using the Uniform Data System for 739 CHCs from 2009 to 2015. During our study period, 12 states liberalized NP SOP laws and 14 states changed their PA SOP regulations. The number of visits per full-time equivalent clinician (NP, PA, and PCP) per year was the outcome of interest and was linked to the degree of state SOP restriction for NPs and PAs in a given year.

Conclusions: Granting independent practice and prescriptive authority for NPs resulted in statistically significant increases in NP visits, and decreases in both PA and PCP visits, for those CHCs with a high proportion of NPs and PAs along with the increased provision of support staff. PA SOP liberalization had no statistically significant effect on PA visits.

Implications for practice: As the NP and PA workforce continues to grow, and as SOP laws continue to be liberalized, it is important to advance evidence on how to most efficiently deploy these staff.

Keywords: Community health centers; health workforce; primary care; scope of practice.

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Introduction

The growth of the nurse practitioner (NP) and physician assistant (PA) workforce and the expansion of NP and PA scope of practice (SOP) have heightened attention to variations in the ways that these clinicians are deployed in the workplace and the importance of engaging them in a manner that enhances access and cost efficiency (Pittman, Leach, Everett, Han, & McElroy, 2018). Aside from physicians, NPs and PAs are the two principal clinicians delivering primary care in the United States. Over 75% of actively practicing NPs are providing primary care, and nearly 36% of PAs are practicing in primary care settings (American Association of Nurse Practitioners [AANP], 2016; American Academy of Physician Assistants [AAPA], 2016). Studies show that these clinicians are also more likely to provide care for the underserved and to practice in rural areas than physicians and are helping to meet the nation's primary care needs while alleviating the primary care physician (PCP) shortage where physician presence is more limited (Everett, Schumacher, Wright, & Smith, 2009; Graves et al., 2016; Kaiser Commission on Medicaid and the Uninsured, March 2011; Petterson, Phillips, Bazemore, & Koinis, 2013).

Although NPs and PAs are certified by a national body in an area of their specialty, state SOP laws and regulations determine the level of physician supervision or collaboration required of NPs and PAs and the

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boundaries within which these clinicians are authorized to practice. As of 2017, 22 states and the District Columbia allowed NPs to practice and prescribe independently and to the full extent of their education (i.e., diagnosing, treating, and referring patients and prescribing medications). The remaining states required NPs to have some level of oversight by a physician, with the nature of that oversight varying considerably across states (AANP, 2017). The growth of NP independence, in particular, has been an important policy issue amid concerns about primary care provider shortages. Between 2009 and 2015, 12 states (AL, CO, CT, DE, HI, MD, MA, MN, NV, ND, RI, and VT) liberalized their NP SOP regulations in an effort to expand primary care capacity (Authors' own analysis of state statutes and regulations). Physician assistants work directly with a collaborating physician. Most states grant physicians the flexibility to determine the range of medical tasks they can safely delegate to PAs and the methods of supervision. Historically, states have allowed the details of each PA SOP to be decided at the practice level; however, some states have been more explicit regarding supervisory or practice requirements (Dunker, Krofah, & Isasi, 2014). As of 2015, 18 states mandated that physicians be onsite for a specific percentage of time to supervise PAs. Twenty-one states required physicians to review and cosign a certain percentage of charts. Most states also specified how many PAs one physician could safely supervise.

Research suggests that the supply of and demand for these clinicians are significantly associated with cross-state variation in SOP regulatory environment. For example, states with restrictive NP regulations had lower rates of NP workforce growth (Reagan & Salsberry, 2013), whereas states with less restrictive regulations had more patients who received primary care from NPs (Barnes et al., 2017; Kuo, Loresto, Rounds, & Goodwin, 2013). Research on PA SOP laws, on the other hand, is limited, considering the fact that language in state laws is not uniform, as states have historically allowed the details of each PA SOP to be decided at the practice level. One recent study found that having restrictions on surgical procedures in state PA SOP regulations was associated with lower number of PAs per population (Wiler & Ginde, 2015).

Existing analyses on regulatory policies in NP or PA SOP have primarily focused on the direct effects on their own professions, but have not fully considered the potential effects on other professions. Nurse practitioners and PAs contribute to improvements in quality of care by providing care that either complements or substitutes for care provided by physicians (Doescher, Andrilla, Skillman, Morgan, & Kaplan, 2014; Larson, Palazzo, Berkowitz, Pirani, & Hart, 2003; Morgan, Everett, & Hing, 2015; Rohrer, Angstman, Garrison, Pecina, & Maxson, 2013); therefore, the effects of SOP changes could have important implications for the work and the productivity of other professions. Furthermore, very few previous works considered NP and PA regulations simultaneously on the range of primary care clinicians' outcomes, including NPs, PAs, and PCPs. One exception is a study by Perry (2009), which sought to understand the impact of changes in NP authority by specifically incorporating changes in PA authority when examining cross-occupational incomes. The author found that when NPs had greater authority, physician incomes were reduced, while there were differential impacts on PA incomes and improved earnings for NPs. When PAs authority increased, there was a downward effect on NP earnings, a positive impact on physician income, and little impact on PAs' own incomes (Perry, 2009). The body of knowledge concerning the impact of regulatory environment for both NPs and PAs on the contribution of patient care of each primary care clinician type is still sparse.

Our study continues in this vein and adds to what is known about the effect of NPs' and PAs' regulatory environments on primary care delivery. Specifically, we ask whether and to what extent SOP laws for NPs and PAs are associated with shifts in primary care utilization, as measured by the number of visits. Examining this topic is important because there are many services in common that NPs, PAs, and PCPs are trained to provide, such as routine physician examinations and diagnosis and treatment of common acute and chronic illness. This suggests that in some instances—when an expansion of NP or PA SOP brings more competition into the market for primary care services, regardless of clinician type—a greater supply in one group may be associated with barriers to practice for the other. For example, more or less restrictive regulatory policies in NP SOP could not only affect the use of NPs but may have a ripple effect on PAs (and/or PCPs) or vice versa. In addition, there is disagreement among professions and many other stakeholders over whether the growth of NP and PA autonomy could alleviate pressure on primary care capacity. Policy makers want to know whether liberalization of NP and PA SOP laws increases the access to primary care by enabling them to see more patients.

This study examines the effects of expanded NP and PA SOP on the number of visits provided by key primary care clinicians—NPs, PAs, and PCPs—in community health centers (CHCs) between 2009 and 2015. Community health centers are the nation's primary care safety net serving over 25 million medically underserved population (Health Resources and Services Administration, 2017). Because CHCs rely so heavily on NPs and PAs, they may be more significantly affected by SOP reforms for NPs and PAs than other primary care settings (Hing, Hooker, & Ashman, 2011).

Methods

Data

Our primary data source was the longitudinal data from the 2009–2015 Uniform Data System (UDS), collected and maintained by Bureau of Primary Health Care under Health Resources and Services Administration. Each year CHCs that received funding from Section 330 under the Public Health Service Act report CHC grantee-level information to the system, including staffing, service utilization, patient profiles, and quality outcomes. Our secondary data source was the Areas Health Resources File that provides county-level information on health services resources, market supply of health care providers, and other population profiles. For information on NP SOP laws, we used state statutes and regulations between 2009 and 2015. For PA SOP laws, we used the AAPA Six Key Elements of State PA Laws.

Study population

There were 1,007 CHCs reporting consistently across our study period. We limited our sample to those CHCs that were located in the 50 states and the District of Columbia (N = 980). An additional 241 CHCs were excluded because of missing values on key outcomes and/or covariates. After these exclusions, a total of 739 CHCs were analyzed. The baseline characteristics of the 739 CHCs included in this study were not substantially different from those of the 980 eligible CHCs.

Primary care utilization

Our outcome of interest was primary care utilization by each clinician type, including NPs, PAs, and PCPs in CHCs. In this article, PCPs included those in general and family practice, internal medicine, pediatrics, and obstetrics/gynecology. Primary care utilization was measured by the number of severity adjusted visits per each type of full-time equivalent (FTE) primary care clinician per year. The case-mix severity index was calculated based on the average expenditures for each of 11 diagnostic categories (asthma, chronic bronchitis and emphysema, diabetes, heart disease, hypertension, contact dermatitis and other eczema, otitis media and Eustachian tube disorders, depression, anxiety, attention-deficit and disruptive behavior disorders, and other mental disorders) commonly seen in CHCs. This approach builds on prior published research (Ku, Frogner, Steinmetz, & Pittman, 2015).

Scope of practice for nurse practitioners and physician assistants

The explanatory variables of interest indicated, for a given year, whether the state changed its laws that governed the range of services that NPs and PAs could provide and/or the extent to which they could practice independently. Using state statutes and regulations between 2009 and 2015, we obtained NP SOP laws for each state. We focused on two distinct authorities: physician involvement in treatment and diagnosis and prescriptive authority. These are the same categories that have been used in many previous studies (Assistant Secretary for Planning and Evaluation, 2015; Kuo et al., 2013). For each year, we categorized each state as having one of the following types of NP SOP laws: (1) most authority (full practice and prescription); (2) moderate authority (full practice only); and (3) least authority (restricted practice and prescription). During our study period, 12 states (AL, CO, CT, DE, HI, MD, MA, MN, NV, ND, RI, and VT) liberalized their NP SOP regulations (Appendix 1, Supplemental Digital Content 1, available at: http://links.lww.com/JAANP/A24).

We determined the degree of state restrictions on PA SOP during the same period based on the six key elements identified by the AAPA, (2017), including licensure as regulatory term, full prescriptive authority, whether the supervising physician and PA jointly establish a written agreement outlining the PA SOP at the practice level, adaptable supervision requirements, whether cosignature requirements for PAs are determined at the practice level by the supervising physician, and the number of PAs a physician can supervise at one time. The higher the number of elements that are present, the more liberal the state law is for PA SOP. We generated three levels of independence based on the number of elements present as follows: (1) most authority (5–6 key elements), (2) moderate authority (3–4 key elements), and (3) least authority (0–2 key elements). These classifications were found to be effective predictors in an analysis of the level of PA SOP regulations (Hing & Hsiao, 2015; Pittman et al., 2018). A total of 14 states changed their restrictions on PA SOP between 2009 and 2015 (Appendix 2, Supplemental Digital Content 2, http://links.lww.com/JAANP/A25). Although most states liberalized restrictions, two (NM and SD) became more restrictive over time.

Covariates

We controlled for a number of other changes over time within CHCs, including aggregated patient characteristics (age, gender, race/ethnicity, insurance, limited English proficiency, and poverty) and CHC characteristics (support staff per clinician, electronic health record adoption, patient-centered medical home [PCMH] adoption, % of grant over total revenue, and size). We also controlled for CHCs' rural/urban location, median household income, unemployment rate, and the number of NPs/PAs/physicians per 1,000 population in each county.

Analytic approach

Our main analysis estimates the effect of state SOP laws for NPs and PAs on changes in the number of visits per FTE

clinician per year using separate regressions for each of three different primary care clinician types—NPs, PAs, and PCPs. The policy changes occurred at diverse times across states, so the present study exploits this natural experiment by using a Difference-in-Differences (DD) model with CHC and year fixed effects to estimate the main effects with pre–post and treatment–control groups. This approach allowed for mean baseline differences between groups while accounting for secular changes that should not be attributed to the policy intervention. We estimated the effect of SOP policy changes with a 1-year lag to allow for a transition year (i.e., the effect of policy changes may take time to develop). We conducted a sensitivity analysis using a 2-year lag to estimate a persistent steady-state effect; because results led to similar conclusions, we do not present them here.

Given our interest in the potential interactive effects of NP and PA SOP laws on the visit volume among different primary care clinicians, we checked for the presence of interaction terms of NP and PA SOP laws to make sure that we specified the model correctly. However, we found that none of the interaction terms were statistically significant, and because they used up degrees of freedom and changed the meaning of the lower-order coefficients, we dropped them to simplify the final model.

Our model included several departures from the classic DD formulation to incorporate two features. First, we recognized the importance of organizational factors, such as administrative and clinical support, in determining visit volume. For example, while a clinician conducts the evaluation and makes a diagnosis, a medical assistant (MA) may take vital signs, measure and record height and weight, and/or provide health education or counseling to the patient. Even staff who have no patient contact can increase visit volume. For example, laboratory staff can contribute to diagnoses, and quality assurance staff may help monitor and improve care quality. The extent to which medical support staff are available at practice site can affect the number of visits per clinician, as such this may lead to differential effects of state SOP policy within the same regulatory environment. We address this by interacting key state SOP policy variables with the number of support staff (such as MAs, nurse aides, and laboratory or radiology staff) per clinician at each CHC.

Second, to explore the potential heterogeneity of our main effects, we estimated the effects separately by diverse staffing patterns in CHCs. Previous research showed that the overall medical staff configuration patterns vary across CHCs, in accordance with CHC size, rurality, levels of clinician shortages by region, patient characteristics, and possibly the degree of state SOP restrictions of NPs and PAs (Ku et al., 2015). CHCs have presumably learned how to adjust their medical staff while continuing to provide high-quality care in an affordable and efficient manner. The extent to which staffing can be diversified may be an important factor in determining the number of visits a clinician can handle in a given period. Based on staffing reported in the 2009 UDS (baseline), we classified medical staff into four categories, including physicians (medical doctors and doctors of osteopathy; most were in primary care specialties), advanced practice staff (NPs, PAs, and certified nurse-midwives), nurses (registered, licensed vocational, and practical nurses), and other medical staff (such as MAs, nurse aides, and laboratory or radiology staff). Using cluster analysis consistent with the method used in the previous study, we identified four dominant staffing patterns (typical, high advanced practice staff, high nurse staff, and high other medical staff) based on the percentage of medical staff in the four categories (Ku et al., 2015). Rather than model staffing patterns directly as a function of the number of visits—which could give a biased coefficient due to endogeneity bias if a reciprocal relationship exists between these two factors—we instead estimated our models stratifying by four dominant staffing patterns in CHCs. Although we cannot eliminate the possibility of endogeneity bias, this approach likely lessened it.

The models included patient, CHC, and market-level time-varying covariates mentioned above. We clustered standard errors at the CHC level to account for heterogeneity. We report the full regression results in online Supplemental Digital Content 3 (Appendix 3, http://links.lww.com/JAANP/A26). The George Washington University Institutional Review Board waived review of this study. All statistical analyses were performed using Stata 13.

Results

Unadjusted trends in the number of visits per full-time equivalent clinician per year, 2009–2015

Figure 1 summarizes changes in the number of visits per each clinician type per year—NPs, PAs, and PCPs—in CHCs over the 7 years examined. Regardless of clinician type, the number of visits per FTE clinician decreased over time.

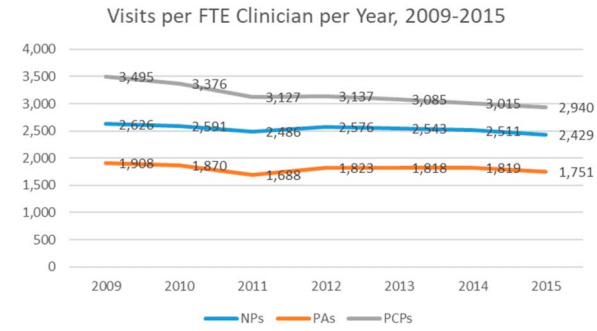

Figure 1. Visits per clinician FTE per year, 2009–2015. The results of analyses were not adjusted for patient, CHC, and market characteristics. CHC = community health center; FTE = full-time equivalent; NP = nurse practitioner; PA = physician assistant; PCP = primary care physician.

The number of visits per FTE NP per year decreased from 2,626 in 2009 to 2,429 in 2015 (7%). The number of visits per FTE PA per year decreased by 8% (from 1,908 in 2009 to 1,751 in 2015), whereas the number of visits per FTE PCP per year also decreased by 16% (from 3,495 in 2009 to 2,940 in 2015).

This phenomenon is somewhat surprising because the increasing availability of NPs and PAs is well documented. Between 2006 and 2016, NP graduation rates more than tripled and PA graduation rates almost doubled (Salsberg, 2015). As a check, we examined the number of FTEs per 10,000 patients per CHC by each clinician type. Consistent with national workforce projections, the number of NP FTEs per 10,000 patients rose on average in each CHC from 2.47 in 2009 to 3.68 in 2015. The number of PA FTEs per 10,000 patients also slightly increased (from 1.28 in 2009 to 1.50 in 2015), whereas the number of PCP FTEs per 10,000 patients slightly decreased over time (from 4.38 in 2009 to 4.13 in 2015) (data not shown here). However, it is important to account not only for the number of clinicians but also for their productivity (in regard to number of visits) by clinician type. We focused on visit outcomes in this study.

Four dominant staffing patterns in community health centers

As shown in **Figure 2**, the medical staffing composition varied widely. We identified four dominant staffing patterns: typical (n = 243), high advanced practice staff (n = 68), high nurse staff (n = 162), and high other medical staff (n = 266). The typical group had a staff distribution similar to the overall national average among CHCs. In the high advanced practice staff group, about 40% of the staff were advanced practice clinicians. In the high nurse staff group, almost half of the staff were nurses, and in the high other medical staff group, more than half of the staff were other medical professionals. The high advanced practice staff group had a lower percentage of physicians (12.3%) than any other groups. As detailed below, the four staffing clusters varied in a number of ways.

Descriptive statistics

Table 1 presents descriptive statistics for all CHCs and separated by staffing cluster. Across all CHCs, the average number of visits by FTE clinician per year was 2,537 for NPs, 1,811 for PAs, and 3,168 for PCPs. The five columns on the right in **Table 1** compare summary statistics for key outcome measures and covariates in the model for CHCs in four staffing clusters we identified. Consistent with the previous study, CHCs in the high advanced practice staff and high nurse staff clusters tended to be small in size and located in rural and poor areas (Ku et al., 2015). The high advanced practice staff CHCs, in particular, had the greatest share of uninsured patients (46%) and the lowest

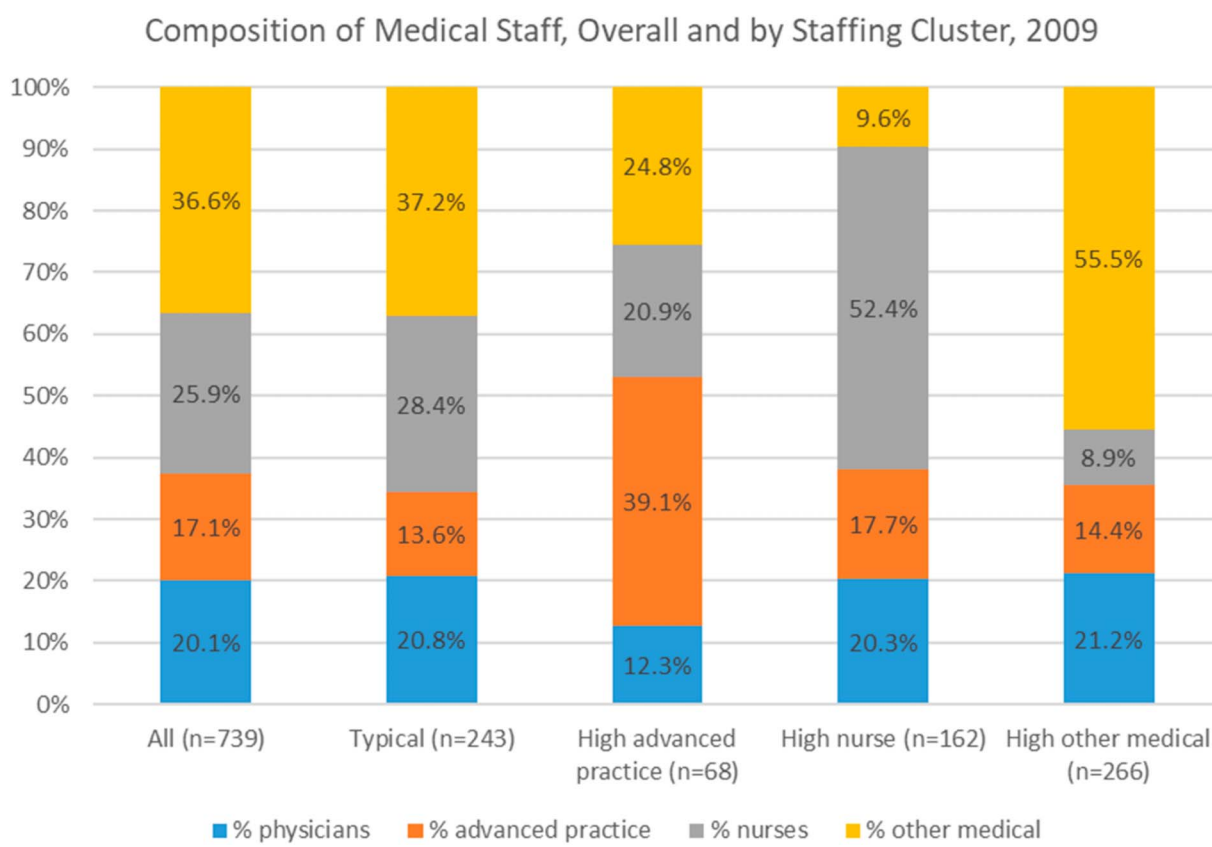

Figure 2. Composition of medical staff, overall and by staffing cluster, 2009.

Table 1. Average characteristics of the study sample, overall and by staffing cluster, 2009–2015

	All	(1) Typical	(2) High Advanced Practice	(3) High Nurse	(4) High Other Medical	*p* Value
Visits per FTE clinician per year						
NPs	2,537.45 (1,105.10)	2,610.71 (900.81)	2,030.12 (1,115.18)	2,473.59 (1,151.94)	2,639.11 (1,201.64)	<.001
PAs	1,810.78 (1,582.26)	1,809.42 (1,482.23)	1,358.40 (1,329.29)	1,434.44 (1,564.33)	2,156.86 (1,658.75)	<.001
PCPs	3,167.77 (1,073.21)	3,229.07 (825.05)	2,100.52 (1,337.01)	3,219.72 (1,136.45)	3,352.95 (1,002.94)	<.001
Patient characteristics						
Age (years)						
18 and younger (children)	0.29 (0.13)	0.28 (0.12)	0.24 (0.16)	0.26 (0.12)	0.32 (0.13)	<.001
19–64 (adults)	0.63 (0.12)	0.63 (0.11)	0.68 (0.16)	0.63 (0.12)	0.61 (0.12)	<.001
65 and older (aged)	0.08 (0.06)	0.09 (0.05)	0.07 (0.06)	0.10 (0.07)	0.07 (0.05)	<.001
Gender						
Male	0.43 (0.07)	0.42 (0.06)	0.48 (0.11)	0.44 (0.07)	0.41 (0.06)	<.001
Female	0.57 (0.07)	0.58 (0.06)	0.52 (0.11)	0.56 (0.07)	0.59 (0.06)	<.001
Race/ethnicity						
White	0.58 (0.30)	0.57 (0.28)	0.58 (0.33)	0.66 (0.28)	0.54 (0.32)	<.001
Black	0.20 (0.25)	0.23 (0.25)	0.19 (0.27)	0.19 (0.24)	0.19 (0.26)	.121
Asian/Pacific Islander	0.04 (0.11)	0.04 (0.12)	0.02 (0.05)	0.02 (0.06)	0.05 (0.13)	<.001
American Indian/Alaska Native	0.03 (0.11)	0.02 (0.09)	0.09 (0.22)	0.02 (0.06)	0.02 (0.10)	<.001
Other/unknown	0.16 (0.20)	0.15 (0.17)	0.13 (0.17)	0.11 (0.15)	0.20 (0.24)	<.001
Hispanic	0.24 (0.27)	0.21 (0.22)	0.19 (0.24)	0.14 (0.20)	0.35 (0.30)	<.001
Insurance type						
Uninsured	0.37 (0.20)	0.35 (0.18)	0.46 (0.23)	0.35 (0.20)	0.37 (0.19)	<.001
Medicaid	0.35 (0.17)	0.36 (0.16)	0.28 (0.17)	0.30 (0.16)	0.40 (0.18)	<.001
Medicare	0.09 (0.06)	0.10 (0.06)	0.08 (0.06)	0.12 (0.07)	0.07 (0.05)	<.001
Other public	0.02 (0.04)	0.02 (0.04)	0.01 (0.03)	0.01 (0.03)	0.02 (0.04)	<.001
Private	0.17 (0.13)	0.17 (0.13)	0.17 (0.15)	0.22 (0.14)	0.13 (0.12)	<.001
Patients with limited English proficiency	0.17 (0.21)	0.15 (0.19)	0.13 (0.22)	0.09 (0.15)	0.24 (0.24)	
Patients with income 100% and below poverty level	0.51 (0.24)	0.50 (0.23)	0.52 (0.28)	0.48 (0.25)	0.53 (0.23)	
CHC characteristics						
Support staff per clinician	1.06 (0.73)	1.07 (0.52)	0.65 (0.58)	0.37 (0.42)	1.58 (0.65)	<.001
EHR	0.75 (0.43)	0.77 (0.42)	0.68 (0.47)	0.74 (0.44)	0.75 (0.44)	<.001
PCMH	0.34 (0.47)	0.38 (0.48)	0.25 (0.43)	0.30 (0.46)	0.34 (0.47)	<.001
Grant over total revenue	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	<.001

(*continued*)

Table 1. Average characteristics of the study sample, overall and by staffing cluster, 2009–2015, *continued*

	All	(1) Typical	(2) High Advanced Practice	(3) High Nurse	(4) High Other Medical	*p* Value
Large size (>median patients)	0.50 (0.50)	0.60 (0.49)	0.22 (0.42)	0.35 (0.48)	0.57 (0.49)	<.001
Market (county) characteristics						
Rural	0.51 (0.50)	0.49 (0.50)	0.65 (0.48)	0.71 (0.45)	0.39 (0.49)	<.001
Median household income in $1,000	48.68 (12.65)	48.32 (12.20)	47.98 (13.10)	44.37 (11.20)	51.80 (12.94)	<.001
Unemployment	0.08 (0.03)	0.08 (0.03)	0.09 (0.03)	0.08 (0.03)	0.09 (0.03)	<.001
NPs with NPI per 1,000 population	0.51 (0.40)	0.54 (0.41)	0.63 (0.52)	0.51 (0.36)	0.45 (0.36)	<.001
PAs with NPI per 1,000 population	0.31 (0.25)	0.32 (0.24)	0.42 (0.39)	0.26 (0.25)	0.30 (0.22)	<.001
Physicians per 1,000 population	0.72 (0.32)	0.77 (0.33)	0.66 (0.33)	0.63 (0.32)	0.76 (0.31)	.017
State SOP						
NPs						
Most authority (full practice and prescription)	21.79%	15.08%	22.40%	19.93%	42.02%	<.001
Moderate authority (full practice only)	19.10%	24.34%	15.36%	20.99%	14.50%	
Least authority (restricted practice and prescription)	59.11%	60.58%	62.24%	59.08%	43.49%	
PAs						
Most authority (5–6 key elements)	25.63%	20.02%	25.73%	28.04%	30.04%	<.001
Moderate authority (3–4 key elements)	37.87%	29.98%	48.44%	31.92%	36.55%	
Least authority (0–2 key elements)	36.50%	50.00%	25.83%	40.04%	33.40%	
Observations	5,173	1,701	476	1,134	1,862	
Number of CHCs	739	243	68	162	266	

Note: CHC = community health center; EHR = electronic health record; FTE = full-time equivalent; NP = nurse practitioner; NPI = national provider identifier; PA = physician assistant; PCMH = patient-centered medical home; PCP = primary care physician; SOP = scope of practice.

rate of electronic health record and PCMH adoption (68% and 25%, respectively). The high advanced practice staff cluster also had the lowest number of visits per FTE per year than any other clusters (2,030 for NPs, 1,358 for PAs, and 2,101 for PCPs), without regard to clinician type. There may be a variation in the types of care provided in the different clusters, but it is important to remember that the visits were weighted to adjust for differences in patients' diagnoses.

Liberalizing scope of practice for nurse practitioners and physician assistants

Table 2 reports the effects of liberalizing NP and PA SOP laws on the number of visits attributed to each type of

Table 2. Impact of expanded SOP for NPs and PAs on primary care utilization in CHCs

	Visits per FTE NP per Year				
	All	(1) Typical	(2) High Advanced Practice	(3) High Nurse	(4) High Other Medical
NP SOP					
NP SOP_lag1 (most authority)	−320.64* (182.10)	−124.35 (333.03)	−222.34 (267.05)	−583.89** (267.89)	−41.05 (298.34)
NP SOP_lag1 (moderate authority)	92.91 (127.01)	−91.12 (204.80)	20.37 (217.24)	263.68* (138.52)	378.66 (373.01)
NP SOP_lag1 (most authority) × support staff per clinician	206.96 (136.03)	112.02 (275.60)	396.03* (227.72)	430.73 (367.97)	17.48 (131.75)
NP SOP_lag1 (moderate authority) × support staff per clinician	99.56 (127.53)	99.64 (185.58)	−26.08 (433.01)	295.59 (215.89)	−6.41 (252.68)
PA SOP					
PA SOP_lag1 (most authority)	−133.95 (122.89)	−256.37 (318.56)	422.70 (274.73)	56.60 (203.63)	−491.60** (198.83)
PA SOP_lag1 (moderate authority)	−53.98 (142.71)	−390.45 (285.17)	354.88 (326.37)	637.58** (245.98)	−519.10** (251.21)
PA SOP_lag1 (most authority) × support staff per clinician	100.59 (84.36)	202.28 (271.54)	−958.95*** (218.47)	271.84 (211.42)	294.73*** (94.16)
PA SOP_lag1 (moderate authority) × support staff per clinician	96.71 (96.93)	303.52 (226.63)	−755.40** (298.67)	−375.42* (192.67)	415.07*** (129.23)
NP SOP					
NP SOP_lag1 (most authority)	−38.74 (144.84)	35.62 (289.90)	−577.15* (313.14)	233.77 (218.28)	6.42 (251.40)
NP SOP_lag1 (moderate authority)	−23.23 (121.34)	39.02 (253.31)	492.74 (334.37)	−190.29 (148.92)	−70.62 (336.99)
NP SOP_lag1 (most authority) × support staff per clinician	6.53 (108.06)	−38.67 (206.60)	−251.37 (288.27)	−869.74*** (285.27)	82.20 (149.72)
NP SOP_lag1 (moderate authority) × support staff per clinician	−48.76 (106.75)	−12.98 (236.14)	−1,303.78** (544.14)	51.92 (236.59)	31.18 (193.11)
PA SOP					
PA SOP_lag1 (most authority)	−24.47 (141.44)	−180.38 (340.19)	−66.67 (267.77)	−155.62 (239.42)	211.90 (268.41)
PA SOP_lag1 (moderate authority)	−205.58 (163.10)	−52.55 (367.45)	−248.24 (416.99)	−325.77 (247.73)	−299.70 (272.63)
PA SOP_lag1 (most authority) × support staff per clinician	−75.44 (83.72)	−12.83 (224.45)	−248.13 (293.57)	118.14 (274.04)	−146.94 (124.56)

(*continued*)

Table 2. Impact of expanded SOP for NPs and PAs on primary care utilization in CHCs, *continued*

	Visits per FTE NP per Year				
	All	(1) Typical	(2) High Advanced Practice	(3) High Nurse	(4) High Other Medical
PA SOP_lag1 (moderate authority) × support staff per clinician	84.42 (112.93)	8.08 (256.01)	432.77 (427.09)	146.80 (260.12)	113.29 (152.08)
NP SOP					
NP SOP_lag1 (most authority)	72.67 (194.72)	76.16 (161.96)	58.51 (481.96)	−423.25 (270.42)	667.38 (405.83)
NP SOP_lag1 (moderate authority)	55.16 (128.79)	−134.04 (168.22)	515.18 (320.95)	283.40 (233.77)	−368.92 (259.43)
NP SOP_lag1 (most authority) × support staff per clinician	−178.10 (141.29)	107.54 (116.36)	−704.62** (273.82)	146.30 (354.88)	−517.26** (224.34)
NP SOP_lag1 (moderate authority) × support staff per clinician	−36.92 (99.48)	140.20 (147.50)	−951.66** (449.42)	−47.07 (220.49)	166.09 (174.25)
PA SOP					
PA SOP_lag1 (most authority)	−71.38 (100.83)	−96.69 (169.88)	−350.85 (341.52)	−104.94 (164.64)	−16.58 (177.99)
PA SOP_lag1 (moderate authority)	−13.60 (111.67)	−168.49 (174.89)	−148.71 (380.66)	167.37 (178.88)	102.50 (204.56)
PA SOP_lag1 (most authority) × support staff per clinician	60.47 (62.81)	37.89 (129.99)	184.84 (280.78)	229.50 (216.55)	39.87 (83.87)
PA SOP_lag1 (moderate authority) × support staff per clinician	−34.24 (84.92)	54.54 (126.53)	−54.46 (346.48)	−286.36 (194.76)	−98.40 (138.41)

***p < .01, **p < .05, *p < .1*

Note: Robust standard errors in parentheses. The models controlled for CHC fixed effects, year fixed effects, and the following time varying control variables: patient characteristics (age, gender, race/ethnicity, insurance, limited English proficiency, and poverty), CHC characteristics (support staff per clinician, EHR adoption, PCMH adoption, % of grant over total revenue, and size), and market characteristics (rural/urban location, median household income, unemployment rate, and the number of NPs/PAs/physicians per 1,000 population in each county). The full model for Table 2 is in Supplemental Digital Content 3 (Appendix 3, http://links.lww.com/JAANP/A26). CHC = community health center; EHR = electronic health record; FTE = full-time equivalent; NP = nurse practitioner; PA = physician assistant; PCMH = patient-centered medical home; PCP = primary care physician; SOP = scope of practice.

clinician in CHCs. Several aspects of **Table 2** are worth noting. Overall, for all CHCs, regardless of clinician type, there was no statistically significant change in the number of visits attributed to each FTE clinician associated with liberalizing either NP or PA SOP laws. The results, however, show statistically significant variation in the effects of liberalizing NP and PA SOP laws across the subsets of CHCs by diverse staffing clusters and the extent to which medical support staff were available at each CHC. Statistically significant estimates on the interactions of SOP laws and levels of support staff suggest that the number of visits by each clinician type was more responsive to the level of support staff when state regulatory environment became more favorable for NPs and PAs. Therefore, in **Table 2**, presentation of the results focuses on the interaction terms between key state SOP policy variables and the number of support staff in the four staffing clusters.

We found that in response to the expanded NP SOP laws, only the high advanced practice staff group had statistically significant cross-profession effects. Among CHCs with a high proportion of advanced practice staff,

granting both independent practice and prescriptive authority for NPs increased the number of visits attributed to each FTE NP (i.e., a marginal increase of 396 visits per FTE NP per year at $p < .1$), but only when the number of support staff per clinician increased. The number of visits per FTE PA per year declined by 1,304 when granting NPs practice authority ($p < .05$). The number of visits per FTE PCP per year also declined by 705 when granting NPs both practice and prescriptive authority ($p < .05$) and by 952 when granting NPs practice authority ($p < .05$).

As for PA SOP laws, SOP effects were less pronounced for PAs themselves when compared with NPs. In the same model, PAs having greater authority had no significant effects on their own visits or PCP visits, regardless of the type of staffing clusters and the level of support staff. However, states with greater authority in PA SOP had a significant decrease in the number of NP visits (i.e., ranging from 755 to 959 visits per FTE NP per year) among CHCs with a high proportion of advanced practice staff. Conversely, we found that the number of NP visits significantly increased (i.e., ranging from 295 to 415 visits per FTE NP per year) for the high other medical group.

Discussion

We hypothesized that relaxing supervision requirements of NPs or PAs would increase the visits to NPs or PAs (potentially PCPs as well) by eliminating unnecessary delays in care. We also expected that relaxing these requirements would have a larger effect on NPs than on PAs because PAs are tied more closely to their supervising physicians than NPs. Our results are far more complex and suggest several new hypotheses that merit further investigation.

The results of our empirical analyses provide little evidence that liberalizing either NP or PA SOP laws increased primary care utilization in CHCs. Across all CHCs, there was no statistically significant change in the number of visits attributed to each FTE clinician associated with liberalizing either NP or PA SOP laws, regardless of clinician type. On the other hand, we observed wide variation in the number of visits attributed to NPs, PAs, and PCPs in different staffing patterns and by type of state SOP law. This suggests that NPs' and PAs' responsibilities might vary substantially across CHCs and that SOP laws would have a differential effect depending on the underlying staffing configuration and, presumably, the relative roles of each type of clinicians. In this context, perhaps our most important finding is that full NP SOP was only significantly associated with increased NP visits when the number of support staff per clinician increased. Although additional data on changing roles and responsibilities in these models are needed to understand why this is occurring, these findings seem to point to the importance of teams with strong organizational support and resources being a prerequisite for increased NP visits in state with full NP SOP laws.

A second important set of findings emerge from our analysis of the interaction of SOP laws across professions. By exploiting differences in the timing of state SOP policy changes from 2009 to 2015, we were able to examine whether expanded SOP in one staff category could affect the visits to other type of primary care clinicians. We find that there is an interaction, although the analysis is puzzling. We see the cross-profession effects primarily in high advanced practice groups, with NP SOP liberalization positively affecting NP visits in those staffing clusters, but negatively affecting both PA and PCP visits. Although PA SOP did not have a statistically significant effect on PA visits in any staffing clusters, it negatively affected NP visits in CHCs with high advanced practice staff and positively affected in CHCs with high other medical staff. These mixed results are not entirely without plausibility. If SOP restrictions for NPs are resulting in these three groups working together in complementary, rather than substitutional relationships (Kleiner, Marier, Park, & Wing, 2016), lifting restriction could increase the substitution dynamic, with the resulting decreases in PA and PCP visits and NP visits grow—although, again, this was only in high advanced practice CHCs.

For PAs, SOP effects are even more muted. This is consistent with the idea that even under full PA SOP, PAs have historically provided a more complementary function to PCPs than NPs. The mixed effects on NPs, with NP increases in high other medical models, are more complex. It may speak again of the importance of support staff to enhanced visit volume, even in the context of expanded PA SOP.

Overall, we return to an increasingly strong theme emerging from recent research: the building evidence that organizational policies may matter as much as state legal SOP regulations in determining how NPs and PAs are used (Park, Athey, Pericak, Pulcini, & Greene, 2018; Pittman et al., 2018; Poghosyan, et al., 2013a; Poghosyan, Nannini, Stone, & Smaldone, 2013b). Organizations deploy NPs and PAs differently, use NPs and PAs in variable capacities, and the NP and PA role in care delivery varies from organization to organization. In some settings, NPs and PAs serve as independent primary care clinicians delivering ongoing continuous care to their own patient panels, whereas in other settings, they just deliver episodic care. Consistent with this notion, we observed the existence of various staffing configurations (such as high typical, high advanced practice, high nurse, and high other medical) across CHCs and wide variation in primary care utilization of NPs and PAs across the subsets of CHCs by diverse staffing clusters even within the same state regulatory environment.

Limitations

Our analysis has several limitations. One of the limitations is that there is a lack of information about wages, so any effect due to wage differences is unknown. Second, although we used a DD approach, the observational nature of this study limits the ability to draw causal conclusion on changing SOP and CHC outcomes. Third, because UDS data were reported at the CHC grantee level, we were only able to observe the aggregate change at the CHC grantee level and unable to adjust for site-level characteristics. Fourth, the level of support staff was only available at the CHC level. We were unable to calculate the level of dedicated support staff assigned to each clinician. Last, the visits were weighted to adjust for differences in patients' diagnoses within the CHC; it cannot account for patient severity differences by each clinician type.

Conclusion

Notwithstanding the limitations, this study provides new input in the debate over the effects of SOP laws, in particular for NPs. Liberalizing NP SOP laws seems to increase the number of visits attributed to NPs only if they are adequately staffed. This suggests that for these legal reforms to actually increase access to primary care, organizations must also take actions to allow NPs to practice to the full extent of their education, and they must staff them adequately. The story for PAs seems less clear. Indeed, the profession may be evolving in its roles over time in part as a result of the changes in the NP regulatory environment, and this may explain the absence of significant effects during our study period. Debate as to whether NPs and PAs provide similar or different roles in health delivery services continues (Everett, Morgan, & Jackson, 2016; Hing et al., 2011; Hooker, Brock, & Cook, 2016). Understanding these issues is key to enhancing access to care and the efficiency of CHCs. The growth of the NP and PA workforce in primary care is undisputed, making a better understanding of how and why NPs and PAs are deployed across CHCs particularly important.

Last, new care delivery models, from the PCMHs to Accountable Care Organizations, are putting emphasis on team-based, multidisciplinary care to improve quality and outcomes. In the time since these data were collected, there has been a major legislative initiative within the professional associations. For example, the AAPA recently passed a resolution seeking to advance the concept of "Optimal Team Practice" through legislative and regulatory change (AAPA, 2019). As current movement toward team practice continues to evolve, it is possible that greater NP and PA authority may facilitate the provision of team-based care and/or task specialization that were not captured in this study. Removing the legal constraints and administrative burdens further makes clinicians who work together as a team to more effectively meet patient needs.

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