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## Restricting Access: A Secondary Analysis of Scope of Practice Laws and Pre-exposure Prophylaxis Prescribing in the United States, 2017

**Neal Carnes, PhD\* [Health Scientist],**

Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

**Jun Zhang, MD, MSPH [Associate Director, Epidemiologist],**

CORE at Merck & Co, Kenilworth, New Jersey,

Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA,

**Deborah Gelaude, MA [Behavioral Scientist],**

Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

**Ya-lin A. Huang, PhD [Senior Service Fellow],**

Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

**Yuko Mizuno, PhD [Behavioral Scientist and Associate Chief of Science],**

Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

**Karen W. Hoover, MD, MPH [Medical Epidemiologist and Team Lead]**

Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA.

### Abstract

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\*Corresponding author: Neal A. Carnes, mwi2@cdc.gov.

#### Author Contributions

N. Carnes was responsible for conceptualizing the research question and study design, provided leadership in developing the study, and wrote the original draft and oversaw revisions of the manuscript. J. Zhang led the statistical analysis, cleaned and prepared the data for analysis, and took a lead in developing the methodological approach. D. Gelaude provided direction on the study structure, assisted in identifying relevant background literature, and helped build the analytic framework. Y. A. Huang secured the primary data sources, assisted in developing the methodological approach, and was engaged in statistical analysis and reporting. Y. Mizuno helped frame the manuscript, contributed to the methodological approach, and engaged in framing the manuscript. K. W. Hoover provided a health care provider lens to the study as well as framed the analysis and statistical interpretation. All coauthors contributed to the original draft and helped revise the manuscript.

#### Disclosures

The authors report no real or perceived vested interests related to this article that could be construed as a conflict of interest.

#### Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

To assess advanced practitioners' scope of practice laws (i.e., legal authority providers can prescribe regulated medications) as potential barriers to HIV pre-exposure prophylaxis (PrEP), we conducted an analysis using IQVIA Real World Data in association with scope of practice law classifications supplied by the American Association of Nurse Practitioners and [scopeofpracticepolicy.org](https://www.aanp.org/scopeofpracticepolicy.org). Nurse practitioners in states that allowed independent scope of practice were 1.4 times more likely to have prescribed PrEP compared with nurse practitioners in states where their prescribing authority is determined by a supervising medical doctor (MD). Physician assistants in states where the law or a state board defined their prescribing authority were more than twice as likely to prescribe PrEP compared with those in states where a supervising MD oversaw prescribing rights. Our findings suggest that restricting scope of prescribing practice by requiring MD oversight limits PrEP access and poses a barrier to scaling up PrEP.

## Keywords

ending the HIV epidemic; PrEP; scope of practice laws; secondary statistical analysis

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The Centers for Disease Control and Prevention recommends pre-exposure prophylaxis (PrEP) for persons without HIV who have a partner with HIV; gay, bisexual, and other men who have sex with men who report sexual risk behaviors; heterosexual men and women who report sexual risk behaviors; and persons who inject drugs and share injection equipment (Dominguez et al., 2016). In 2016, approximately 1.1 million persons were estimated to have indications for PrEP in the United States; however, less than 20% of that estimated number were prescribed and filled a PrEP prescription (Smith et al., 2018; Ya-lin et al., 2018). Access barriers to PrEP remain problematic for particular populations, including at-risk African American heterosexual women and African American and Latino men who have sex with men (Elopre et al., 2017; Goparaju et al., 2017; Lelutiu-Weinberger & Golub, 2016; Pérez-Figueroa et al., 2015).

A potential access barrier involves the legal requirement that a licensed medical provider (e.g., a medical doctor [MD], nurse practitioner [NP], or physician assistant [PA]) must prescribe PrEP. Each state has established distinct criteria that MDs, NPs, and PAs must meet to prescribe medications such as PrEP; these conditions are referred to as "scope of practice." Scope of practice is defined as the clinical services a licensed health professional is permitted to perform and the degree of autonomy the providers have when diagnosing conditions as well as prescribing controlled medications (American Nurses Association, n.d.). Some state laws governing NPs' and PAs' scope of practice allow a supervisory MD to determine what medications, including PrEP, an NP or a PA can and cannot prescribe. Other states allow NPs independent prescribing authority, meaning they can prescribe PrEP without oversight, and some states determine what medications, or class of medications, PAs can prescribe as a matter of law and state-level oversight minus local MD oversight. Given this variation, oversight and legal restrictions on scope of practice may present an access barrier to PrEP for patients in an NP's or PA's care.

An MD's knowledge, attitude toward, and willingness to prescribe PrEP can determine NPs' and PAs' scope of practice in states that require MD oversight. This determination can pose

a concern when the supervising MD and the knowledge, attitude, or willingness of the NP or PA they are supervising do not align. Studies have found that a number of MDs were not willing to prescribe, or had reservations about prescribing, PrEP to certain or all indicated populations (Calabrese et al., 2014; Petroll et al., 2017; Smith et al., 2016). These findings suggest that individuals who could benefit from HIV prophylaxis, live in a state that restricts scope of practice, and are in the care of NPs and PAs being supervised by an MD not knowledgeable about, hold a contrary attitude toward or are unwilling to prescribe PrEP confront an access barrier based on the supervising MD's position.

In this analysis, we studied the association between new PrEP prescription fills in 2017 and state-level scope of practice laws. We hypothesized that states restricting scope of practice would result in fewer PrEP prescriptions written by NPs and PAs. To develop interventions that support elimination of HIV by 2030, it is important to understand barriers to increased PrEP use, such as limiting PAs' and NPs' scope of practice.

## Methods

### Data

We analyzed the commercially available, 2012 to 2017 IQVIA Real World Data—Longitudinal Prescriptions (IQVIA database) using a previously reported algorithm that distinguishes tenofovir disoproxil fumarate and emtricitabine (i.e., Truvada, brand name)—the only Food and Drug Administration–approved medication for HIV prophylaxis at the time of this study—prescription fills for prophylactic purposes to determine new PrEP prescriptions in 2017 (Wu et al., 2016; Ya-lin et al., 2018). The IQVIA database captured prescription fills from all payer types, representing approximately 92% of prescriptions dispensed from retail pharmacies and 60% to 86% dispensed from mail order outlets in the United States (Ya-lin et al., 2018). The database also included patient's age, state of residence, date of prescription fill, and provider licensure type. We aggregated PrEP data at the state level based on where the patient lived when they filled the prescription. For each state, we calculated the proportion of PrEP prescriptions prescribed by NPs, PAs, and MDs. We restricted our study population to patients who were newly prescribed PrEP by excluding patients with PrEP prescriptions before 2017. Our analysis focused on each patient's first PrEP prescription and the prescribing provider type. In addition, we excluded prescriptions if they did not have provider licensure information.

For the scope of practice law variables, we used assessments conducted by the American Association of Nurse Practitioners (AANP) for NPs, and the National Conference of State Legislatures (NCSL) and the Association of State and Territorial Health Officials (ASTHO) for PAs. These assessments classified state-level scope of practice laws according to the degree of independent practice and, if not independent, the duration required to practice with MD oversight. For NPs, AANP categorized the laws as follows: (a) *full* practice (no MD supervision required, independent practice), (b) *reduced* practice (a period of MD supervision before independent practice), and (c) *restricted* practice (ongoing MD supervision required; American Association of Nurse Practitioners, 2017). For PAs, NCSL–ASTHO categorized as follows: (a) the state law restricted the medications PAs could prescribe, (b) the law granted a state board authority to determine scope of practice, and (c)

authority to determine scope of practice was granted to a supervising MD (National Council of State Legislators & Association of State and Territorial Health Officials, 2018).

After establishing our base totals and proportions, we conducted a descriptive test comparing the percentage of PrEP prescriptions by provider type and scope of practice law categories. We collapsed two PA scope of practice categories by aggregating the only state that granted authority to the State Board of Medicine to determine prescribing rights with the states that restricted prescribing authority based on legislated formularies. Combined, these states apply restrictions at the state level rather than at a local practice level.

In addition, we built multivariable models that included state-level covariates, including percent of persons younger than 25 years, percent male, percent living under the federal poverty level, percent with insurance coverage, percent African American, percent Hispanic/Latino, and estimated number of persons with PrEP indications to assess their association with the dependent state aggregate-level outcome of the proportion of PrEP prescriptions by NPs and PAs and the independent scope of practice law variables. For the bivariate model predicting NPs' PrEP prescribing, we aggregated reduced practice states with their full practice counterparts, given that MD supervision typically lasted 2 years. We assumed most NPs would have achieved the required period of supervision and transitioned to full practice. We used the aforementioned PA scope of practice law variable for the model predicting PAs' PrEP prescribing. We obtained state-level sociodemographic data from the US Census Bureau's 2017 American Community Survey 1-year estimates (United States Census Bureau, 2019). The state aggregate-level age variable was percent 25 years of age or younger, and the gender variable is percent male in each state. We defined poverty as the percentage of all people who lived below the federal poverty level in the calendar year. Uninsured was defined as percentage of the population without health insurance coverage (private or public). Race was defined by percent African American, and ethnicity was defined by percent Hispanic/Latino. The estimated number of adults with indications for PrEP in each state was obtained from a recent publication (Smith et al., 2018). Given the analysis was conducted with commercially and publicly available deidentified data, it was institutionally determined that institutional review board approval was not required.

### Statistical Analysis

We used descriptive statistics to estimate the number of new PrEP users and the provider type by state in 2017. For each of the outcomes, we computed bivariate and multivariate prevalence ratios (PRs) to determine the association between the proportion of PrEP prescribed by NP or PA and state-level characteristics. We conducted two models to assess the association between state law and the proportion of PrEP prescribed by NP or PA, adjusting for estimated PrEP need at the state level and state population characteristics, including proportion of age cohort, gender, poverty rate, uninsured rate, race, and ethnicity. Because the outcomes measured are common (prevalence above 10%), we estimated the PR using a Poisson regression model with robust error variance. We used forward stepwise selection to determine the factors that were adjusted for in each model. Only those characteristics that were significant at  $p$ -level ( $<.05$ ) were kept in the final model. The analysis was conducted with SAS 9.4.

## Results

### Sample Characteristics

We identified 80,328 unique patients who filled PrEP prescriptions for the first time in 2017; of those, 1,326 (1.7%) prescriptions had missing provider-type data and thus were excluded from our analysis (data not shown). As a result, 79,002 (98.3%) unique patient prescriptions with provider-type data (i.e., NP, PA, or MD licensure) informed our analysis (Table 1). NPs wrote 21,778 (27.6%) of the new PrEP prescriptions, PAs wrote 8,532 (10.8%), and MDs wrote the remaining 48,692 (61.6%). New PrEP prescriptions ranged from a low of 19 in Wyoming to a high of 13,562 in California. New PrEP prescriptions written by NPs ranged from two in South Dakota to 4,056 in New York. Of interest, NPs wrote nearly half (over 40%) of new 2017 PrEP prescriptions in each of the following states: Alabama, Minnesota, Nevada, New Mexico, Vermont, and Wyoming—all were *full* or *reduced* scope of practice states (Table 1). New PrEP prescriptions written by PAs ranged from two in Mississippi and Wyoming to 1,863 in California.

Regarding NP scope of practice law categories, the AANP assessment determined NPs in 22 states and the District of Columbia had *full* practice rights (Table 1). Sixteen states maintained *reduced* practice rights, and 12 states codified a *restricted* ongoing relationship with an MD that determined NPs' scope of practice (American Association of Nurse Practitioners, 2017). The NCSL–ASTHO analysis of PA scope of practice laws showed that six state laws determined prescribing authority by excluding certain medications or drug schedules, and one state granted prescribing authority oversight to its medical board (Table 1; American Association of Nurse Practitioners, 2017). The other 43 states and the District of Columbia had laws that authorized the local practice level (e.g., supervising MD) to determine PAs' prescribing authority.

### Analytic Findings

We found a statistically significant difference ( $p = .03$ ) when we compared the state-level percentage of PrEP prescriptions written by NPs or PAs according to their respective scope of practice law categories (Table 2). Of interest, a higher percentage of patients in reduced practice states (33%), in which an initial period of transition is required, were prescribed PrEP by NPs than in states that granted full (31%) or restricted practice authority (23%).

Controlling for state-level rates, including percent of persons younger than 25 years, percent male, percent poverty, percent African American, and percent Hispanic/Latino, states that grant NPs full or reduced practice (Table 3) and states that determined PAs' prescribing authority at the state level (Table 4) saw significantly more proportionate PrEP prescriptions written by NPs (adjusted PR 1.37; 95% confidence interval [CI] 1.19–1.59;  $p < .01$ ) and PAs (adjusted PR 2.64; 95% CI 1.56–4.48;  $p < .01$ ) than their counterparts.

Also presented in Tables 3 and 4 are the findings from the bivariate and multivariate models inspecting the association between state-level sociodemographic and estimated PrEP need characteristics and percent of PrEP prescriptions written by NPs and PAs, respectively. In the bivariate models, only age cohort was significantly associated (at  $p = .05$ ) with PrEP prescribing. This finding held in the adjusted models, whereby in states with a higher

proportion of people younger than 25 years, NPs were more likely ( $p < .01$ ) and PAs were less likely ( $p < .01$ ) to prescribe PrEP. In the adjusted models, race and income were significantly associated with NPs' PrEP prescribing and, for the PAs, all sociodemographic variables except gender were significant. On close inspection of the CIs, however, most of the sociodemographic variables' effect was marginal in their significance.

## Discussion

Our findings support the hypotheses that there was an association between categories of state-level scope of practice laws and PrEP prescribing by NPs and PAs. We observed that states that require ongoing MD supervision of NP and PA prescribing practices, with the MD determining which medications an NP and PA can prescribe, and under what conditions, had fewer PrEP prescriptions written by NPs and PAs. Conversely, scope of practice laws that allow NPs to practice independently, or to transition to independent practice after a period of supervision, and states that set PAs' prescribing authority at the state level saw proportionately higher rates of PrEP prescribing by these provider types. These findings present important implications for scaling up PrEP.

To scale up PrEP to meet the estimated need, the US health care system requires more licensed providers to prescribe PrEP (Elion & Coleman, 2016). For the past decade, the number and rate of newly diagnosed HIV cases have been disproportionately higher among racial and ethnic minorities. Persons in these populations can benefit from PrEP, and increasing their PrEP use is necessary to meet the 2030 HIV elimination goal (Centers for Disease Control and Prevention, 2018a, 2018b). In general, primary care settings are increasing their utilization of NPs and PAs to provide health care (Barnes et al., 2018; Cawley, 2012). The care NPs and PAs provide is equivalent in quality to their MD counterparts (Kurtzman & Barnow, 2017). One of the Health Resources & Services Administration's roles in the *Ending the HIV Epidemic: A Plan for America* includes expanding PrEP access through the Bureau of Primary Health Care's (BPHC) Health Center Program (Fauci et al., 2019; Health Resources and Services Administration, 2019). This strategy will rely on the BPHC's network of clinics that serve those in medically underserved areas or populations, such as racial and ethnic minorities. In 2018, this network saw over 28 million patients, more than 40% of which were people who identified as a racial or ethnic minority (Health Resources and Services Administration, 2018a). Related to this analysis, across BPHC clinics, NPs and PAs occupy just less than half of the full-time employee positions that typically have prescribing authority (Health Resources and Services Administration, 2018b). As such, enhancing PrEP services in the BPHC network appears to be an important next step, yet one that will need to contend with either scope of practice laws and/or provider knowledge, attitude, and willingness to prescribe PrEP.

As suggested by our findings, the Ending the HIV Epidemic's (EHE) plans for PrEP may face challenges presented by scope of practice restrictions placed on NPs and PAs. In 2017, 11 of the 26 states included in the first phase of EHE restricted NPs' scope of practice by requiring ongoing MD oversight, and 23 of these 26 states granted oversight to the supervising MD to determine PAs' prescribing authority. These restricted and required MD supervision of NPs' and PAs' scope of practice states can hinder efforts to increase PrEP



uptake and adherent use as BPHC clinic staff must abide by state-level scope of practice laws. Educating MDs, as well as NPs and PAs, on the benefits of PrEP and about the key populations with large numbers of persons with indications for its use may assist in minimizing scope of practice restrictions as an access barrier.

On an encouraging note, the state-level sociodemographic and the estimated PrEP indication variables either did not show an association or the association was marginal in significance. Overall, we assessed that state-level sociodemographic and estimated PrEP need had minimal to no association with the number of PrEP prescriptions written by NPs or PAs. One variable that did result in a significant association to NP and PA PrEP prescribing was age cohort. This finding may reflect that young adults are more likely to seek preventive services such as PrEP, and preventive services are more often provided by NPs (Morgan et al., 2015). In sum, addressing concerns regarding access should consider ways to minimize restrictions on scope of practice, including increasing providers' knowledge about PrEP, improving their attitude toward PrEP, and boosting their willingness to prescribe PrEP.

Increasing PrEP uptake and ensuring adherent use among indicated populations is a key strategy that can help the United States achieve its national goal of reducing new diagnoses by 75% in 5 years and 90% in 10 years (Jones et al., 2019). There are a number of challenges to increasing access, including scope of practice laws, which must be addressed to maximize uptake and adherent use (Hershow et al., 2019; Mayer et al., 2018; Weiss et al., 2018). Addressing access concerns fostered by legal and policy barriers may be one critical step toward reaching the necessary saturation level to eliminate new infections.

### Limitations

There are several important limitations to this analysis. The IQVIA dataset is not comprehensive in that closed health care systems' (e.g., Kaiser) PrEP prescriptions were not captured. In some states, such closed health care systems provide care for large numbers of persons. In addition, there may be some misclassification of provider type in the IQVIA dataset. For instance, a patient may be in an NP's care, yet the supervising MD could have written their PrEP prescription. In addition, this study estimated association between state scope of practice laws for NPs and PAs and PrEP prescribed by them, thus we cannot assume that the limited scope of practice laws caused lower rates of PrEP prescribing by mid-level providers. Our analysis suggests scope of practice laws that limit advanced practice providers produced an observed difference in PrEP prescribing, yet this ecological analysis requires additional research to grasp the relationship between scope of practice laws as a potential barrier to PrEP access and what factors mediate the relationship. Further, this analysis did not consider the proportion of licensed NPs, PAs, and MDs in each state as a potentially confounding factor; NPs and PAs may be more likely to practice in states that grant independent practice, and this may mediate the findings. Finally, this was an ecological rather than individual level of analysis. As a result, we may have missed important factors mediating the association between scope of practice and PrEP prescribing that might have been observed with a more nuanced analytic frame. However, we built several of these factors (e.g., state-level sociodemographic variables and estimation of indicated PrEP need) into our models, and their relationship showed no or marginal significance.

## Conclusion

The findings suggest that restricting NPs' and PAs' scope of practice by requiring MD oversight to prescribe PrEP may have presented a barrier to PrEP. Addressing prescribing and practice restrictions may help increase access to PrEP among patients served by NPs and PAs. Further, increasing MD, NP, and PA awareness and understanding of PrEP can assist in minimizing the influence that restricted scope of practice laws may have on PrEP access. This step would theoretically help increase PrEP access at the provider level by boosting provider willingness to prescribe PrEP. EHE by 2030 will require interventions, activities, and policies that decrease barriers to, or enhance, PrEP access. Helping communities with persons in at-risk populations and the licensed medical providers serving these communities to understand PrEP as a safe and effective HIV prevention tool, and to increase access to PrEP, can be a step toward achieving EHE's goals by 2030.

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### Key Considerations

- Granting nurse practitioners (NPs) and physician assistants (PAs) independent scope of practice, especially regarding preventive services such as pre-exposure prophylaxis (PrEP), may expand access for those served by these advanced practitioners.
- States with concerns about expanding NPs' and PAs' scope of practice should consider expanding detailing and education efforts targeting medical doctors and the NPs and PAs they supervise about PrEP's efficacy to mediate the knowledge and attitude concerns held by hesitant providers.
- Expanding over-the-counter PrEP would mitigate scope of practice oversight as an access barrier.

Distribution of State-Level PrEP Prescriptions by Provider Type and Scope of Practice Law Categories—United States and DC, 2017

Table 1.

State	New PrEP Users		PrEP Prescribed by NPs		PrEP Prescribed by PAs		Scope of Practice Law Categories	
	n	%	n	%	n	%	NP <sup>a</sup>	PA <sup>b</sup>
Alabama <sup>c</sup>	565	43.89	248	43.89	4	0.71	Reduced	Practice
Alaska	65	18.46	12	18.46	15	23.08	Full	Practice
Arizona <sup>c</sup>	1,291	40.20	519	40.20	113	8.75	Full	Practice
Arkansas <sup>c</sup>	211	22.27	47	22.27	6	2.84	Reduced	State law
California <sup>c</sup>	13,562	22.55	3,058	22.55	1,863	13.74	Restricted	Practice
Colorado	1,366	39.39	538	39.39	298	21.82	Full	Practice
Connecticut	875	33.49	293	33.49	126	14.40	Full	Practice
Delaware	111	28.83	32	28.83	4	3.60	Reduced	Practice
DC <sup>c</sup>	2,150	17.53	377	17.53	569	26.47	Full	Practice
Florida <sup>c</sup>	4,215	19.69	830	19.69	325	7.71	Restricted	Practice
Georgia <sup>c</sup>	2,788	10.19	284	10.19	968	34.72	Restricted	State law
Hawaii	265	21.13	56	21.13	11	4.15	Full	Practice
Idaho	118	32.20	38	32.20	14	11.86	Full	Practice
Illinois <sup>c</sup>	4,535	31.09	1,410	31.09	414	9.13	Reduced	Practice
Indiana <sup>c</sup>	790	37.34	295	37.34	10	1.27	Reduced	Practice
Iowa	486	12.76	62	12.76	124	25.51	Full	State law
Kansas	267	16.48	44	16.48	25	9.36	Reduced	Practice
Kentucky <sup>c</sup>	399	17.29	69	17.29	13	3.26	Reduced	State law
Louisiana <sup>c</sup>	1,627	27.54	448	27.54	224	13.77	Reduced	Practice
Maine	132	31.06	41	31.06	6	4.55	Full	Practice
Maryland <sup>c</sup>	1,241	30.62	380	30.62	79	6.37	Full	Practice
Massachusetts <sup>c</sup>	2,957	25.43	752	25.43	182	6.15	Restricted	Practice

State	New PrEP Users		PrEP Prescribed by NPs		PrEP Prescribed by PAs		Scope of Practice Law Categories	
	Total	n	%	n	%	n	NP <sup>a</sup>	PA <sup>b</sup>
Michigan <sup>c</sup>	1,255	248	19.76	76	6.06	76	Restricted	Practice
Minnesota	1,195	560	46.86	55	4.60	55	Full	Practice
Mississippi <sup>c</sup>	235	63	26.81	2	0.85	2	Reduced	Practice
Missouri <sup>c</sup>	992	244	24.60	18	1.81	18	Restricted	State law
Montana	76	21	27.63	17	22.37	17	Full	Practice
Nebraska	217	34	15.67	25	11.52	25	Full	Practice
Nevada <sup>c</sup>	623	289	46.39	46	7.38	46	Full	Practice
New Hampshire	146	57	39.04	13	8.90	13	Full	Practice
New Jersey <sup>c</sup>	1,183	224	18.93	94	7.95	94	Reduced	Practice
New Mexico	396	189	47.73	22	5.56	22	Full	Practice
New York <sup>c</sup>	12,345	4,056	32.86	1,018	8.25	1,018	Reduced	Practice
North Carolina <sup>c</sup>	1,258	239	19.00	222	17.65	222	Restricted	Practice
North Dakota	51	12	23.53	4	7.84	4	Full	Practice
Ohio <sup>c</sup>	1,787	667	37.33	17	0.95	17	Reduced	Practice
Oklahoma <sup>c</sup>	283	54	19.08	23	8.13	23	Restricted	State board
Oregon	1,033	247	23.91	98	9.49	98	Full	Practice
Pennsylvania <sup>c</sup>	3,422	1,366	39.92	165	4.82	165	Reduced	Practice
Rhode Island	340	81	23.82	34	10.00	34	Full	Practice
South Carolina <sup>c</sup>	358	60	16.76	12	3.35	12	Restricted	Practice
South Dakota	34	2	5.88	8	23.53	8	Full	Practice
Tennessee <sup>c</sup>	1,018	397	39.00	29	2.85	29	Restricted	Practice
Texas <sup>c</sup>	5,697	1,638	28.75	491	8.62	491	Restricted	Practice
Utah	499	38	7.62	96	19.24	96	Reduced	Practice
Vermont	98	43	43.88	8	8.16	8	Full	Practice

State	New PrEP Users		PrEP Prescribed by NPs		PrEP Prescribed by PAs		Scope of Practice Law Categories	
	Total	n	%	n	%	NP <sup>d</sup>	PA <sup>b</sup>	
Virginia	784	111	14.16	97	12.37	Restricted	Practice	
Washington <sup>c</sup>	2,867	815	28.43	374	13.04	Full	Practice	
West Virginia	86	25	29.07	11	12.79	Reduced	State law	
Wisconsin	689	157	22.79	62	9.00	Reduced	Practice	
Wyoming	19	8	42.11	2	10.53	Full	Practice	
Total	79,002	21,778	27.57	8,532	10.80			

Note: DC 5 District of Columbia; NP 5 nurse practitioner; PA 5 physician assistant; PrEP 5 pre-exposure prophylaxis.

<sup>d</sup>Source: American Association of Nurse Practitioners' state practice environment. <https://www.aanp.org/advocacy/state/state-practice-environment>. Accessed February 16, 2018.

<sup>b</sup>Source: National Conference of State Legislatures and the Association of State and Territorial Health Officials scope of practice policy—Physician assistants overview. <http://scopeofpracticepolicy.org/practitioners/physician-assistants/>. Accessed February 16, 2018.

<sup>c</sup>Source: HIV.gov Ending the HIV Epidemic. <https://files.hiv.gov/s3fs-public/Ending-the-HIV-Epidemic-Countries-and-Territories.pdf>. Accessed September 20, 2019—states directly targeted by or housing counties targeted for Phase 1 Ending the HIV Epidemic implementation.



**Table 2.** Percent of Total New PrEP Prescriptions by Scope of Practice Law Categories for NPs and PAs, 2017

	NPs			PAs			p Value
	Restricted (n = 12)	Reduced (n = 16)	Full (n = 23)	State-Level Determines (n = 7)	Practice Determines (n = 44)		
Percentage of PrEP prescribed by provider type (%)	22.51	32.96	30.99	22.17	9.99	.03	

*Note.* NP 5 nurse practitioner; PA 5 physician assistant; PrEP 5 pre-exposure prophylaxis.

**Table 3.** Association of State-Level Predictor Characteristics With Percent PrEP Prescription by NPs, 2017

	Unadjusted PR		Adjusted PR	
	PR (95% CI)	p Value	PR (95% CI)	p Value
NP licensure law				
Restricted	Reference	Reference	Reference	
Reduced/full	1.41 (1.20–1.65)	<.01	1.37 (1.19–1.59)	<.01
PrEP indication (per 1,000)	1.00 (1.00–1.00)	.09		
Percentage of population				
Younger than 25 years	1.04 (1.01–1.07)	<.01	1.03 (1.01–1.05)	.01
Male	0.99 (0.96–1.02)	.53		
Income below poverty	0.99 (0.94–1.03)	.59	1.04 (1.01–1.07)	.03
Uninsured	0.98 (0.95–1.01)	.30		
African American	0.99 (0.98–1.00)	.20	0.99 (0.98–0.99)	<.01
Hispanic/Latino	1.00 (0.99–1.01)	.48		

Note. CI 5 confidence interval; NP 5 nurse practitioner; PR 5 prevalence ratio; PrEP 5 pre-exposure prophylaxis.

**Table 4.** Association of State-Level Predictor Characteristics With Percent PrEP Prescription by PA, 2017

	Unadjusted PR		Adjusted PR	
	PR (95% CI)	p Value	PR (95% CI)	p Value
PA licensure law				
State board/excludes mediations	2.22 (1.07–4.60)	.03	2.64 (1.56–4.48)	<.01
Practice determines	Reference		Reference	
PrEP indication (per 1,000)	1.00 (1.00–1.00)	.76	1.00 (0.99–1.00)	.05
Percentage of population				
Younger than 25 years	0.91 (0.85–0.97)	<.01	0.92 (0.87–0.97)	<.01
Male	1.05 (0.95–1.17)	.37		
Income below poverty	1.04 (0.95–1.13)	.44	0.90 (0.81–1.00)	.04
Uninsured	1.02 (0.95–1.10)	.58	0.97 (0.94–1.00)	.03
African American	1.02 (1.00–1.05)	.07	1.03 (1.02–1.05)	<.01
Hispanic/Latino	1.00 (0.99–1.02)	.60	1.04 (1.01–1.06)	<.01

Note. CI 5 confidence interval; PA 5 physician assistant; PR 5 prevalence ratio; PrEP 5 pre-exposure prophylaxis.