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TOWARD A UNIFORM CLASSIFICATION OF NURSE PRACTITIONER SCOPE OF PRACTICE LAWS

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ABSTRACT

Over the last several decades, nurse practitioners have assumed increasingly important roles in the healthcare system. However, some state scope of practice laws limit the ability of nurse practitioners to deliver care by requiring physician supervision of their practices and prescribing activities. A robust literature has evolved around examining the role of these scope of practice laws in various contexts, including labor market outcomes, healthcare access, healthcare prices, and the delivery of care for specific diseases. Unfortunately, these studies use different, and sometimes conflicting, measures of scope of practice laws, limiting their comparability and overall usefulness to policymakers and future researchers. We address this salient problem by providing a consistent coding of nurse practitioner scope of practice laws over a 23-year period based on actual statutory and regulatory language. Our classification of scope of practice laws solves an important problem within this growing literature and provides a solid legal foundation for researchers as they continue to investigate the effects of these laws.

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A data appendix is available at http://www.nber.org/data-appendix/w28192

Introduction

Over a decade after the passage of the Affordable Care Act (ACA), access to healthcare remains an important policy priority at the national and state levels. The recent COVID-19 pandemic has served to emphasize the importance of access to care, as state governments across the country implemented various initiatives to shore up their healthcare systems in the wake of the pandemic. Some of these initiatives focused on removing legal barriers that prevent providers like advanced practice registered nurses (APRNs) from caring for patients to the full extent of their knowledge and training. The idea behind these policies was to increase the capacity of the existing healthcare workforce to increase access to care and provide more resources to address the COVID-19 pandemic. This move to eliminate barriers echoes the more general debate over the appropriate way to regulate APRNs that has increasingly attracted the attention of policymakers and researchers over the last decade.

APRNs are registered nurses (RNs) with advanced degrees and training in primary and specialty care. APRNs are certified to practice in one of four roles: certified registered nurse anesthetists (CRNAs), certified nurse-midwives (CNMs), clinical nurse specialists (CNSs) and nurse practitioners (NPs). These nurses examine patients, provide diagnoses, order tests, provide treatment, and prescribe medications. APRNs are a small but important part of the health care labor force. According to the Bureau of Labor Statistics (BLS), in 2019 there were 251,100 employed nurses working as NPs, CNAs and CNMs (BLS 2019). This number represents only 7 percent of the 2.9 million registered nurses, and an even smaller fraction of the total number of diagnosing and treating practitioners, at about 4 percent. However, NPs, the largest group within the APRN category, represent a substantial portion of primary care providers. The 2019 data shows 153,980 general practice physicians (including family practitioners, internists and general

practitioners) compared to 200,600 NPs. These nurses play critical roles in the health care system by performing many of the same tasks as primary care physicians and often practice in areas where physicians are in short supply (McMichael 2018). This paper will focus on NPs, leaving a discussion of the other types of APRNs to future work.

Although nationally certified, NP practice is governed by state scope of practice (SOP) laws. These laws govern the legal ability of licensed health care professionals to provide medical services. They define providers' roles, articulate oversight requirements (if any), and govern practice and prescriptive authorities. State laws vary along all of these dimensions, but foremost is the oversight requirement imposed on individual providers. In many states, NPs must practice under the supervision of or in collaboration with physicians, and these requirements may be imposed through various means, such as practice protocols or other collaborative agreements. Other states allow NPs to practice to the full extent of their training, education, and experience without oversight from physicians. This is termed "full practice authority" (FPA). Over the past few decades, state SOP laws have been evolving from different forms of oversight towards FPA. Currently, 29 states have adopted SOP laws that grant FPA to NPs.[3]

The movement towards FPA has not been without controversy. State legislatures frequently engage in SOP battles that pit physician advocacy groups against nurse advocacy groups. In 2019, thirty bills in twelve different states were introduced regarding NP SOP with only two enacted (Scope of Practice Policy 2020). Critics of FPA contend that oversight requirements are necessary to protect the public health, while proponents argue that NPs provide care that is similar in quality to that of MDs rendering oversight as unnecessary and costly.

[3] This total does not include California which passed a bill granting NPs FPA on September 29, 2020. This bill has not yet been codified and is not yet effective.

Given the controversial nature of these laws and that the variation in time and state generates a viable "natural experiment" for policy analysis, it is no surprise that the academic literature evaluating the effects of changing SOP laws is proliferating. Outcomes studied include the quality of care, health care costs and prices, employment, wages, and patient access to care. Adams and Markowitz (2018) summarize the results of the literature published until early 2018. Since then, quite a few additional studies have been published and more are in progress. However, one troubling feature of the literature published to date is that many authors rely on different categorizations of the SOP laws. Some authors examine laws that only pertain to practice authority, while others focus only on prescription authority. Still others combine practice and prescription authority. The sources for the laws also vary, with some authors using classifications that are meaningful to nurse advocacy groups but not necessarily appropriate for studying economic or public health outcomes. The disparate classifications make interpreting, summarizing, and comparing results across studies rather difficult. We seek to provide some clarity to this issue. In the pages below, we first describe the features of the laws, followed by a description of the different law categories used by researchers. We then present a database of SOP law changes over time that we believe will be useful to academic researchers. Our legal research has been conducted and verified by legal scholars, and we provide citations to current SOP laws to facilitate the continued development of a consistent classification scheme.

Our goal here is not to argue that any previous study used an incorrect categorization of SOP laws. Rather, we seek to provide a resource to the academic community for consistency in SOP law definitions and the timing of adoption for SOP laws. Consistency in these definitions serves two important functions. From the perspective of researchers, consistency will facilitate the comparison of different results and provide greater context for interpreting results more generally.

From the perspective of policymakers, consistency will provide clearer guidance on which SOP laws are most salient and better insight into which laws should be changed to achieve specific outcomes.

Main Components of SOP laws

SOP laws are a subset of the more familiar occupational licensing laws. While the latter govern everything from entry requirements for particular professions to continuing education requirements, the former are limited to regulating what services members of a profession may provide and the conditions under which they may provide those services. With respect to NPs, not all SOP laws are equally relevant to the economic and public health outcomes that are the focus of most academic and policy-related work. For example, the ability to sign disabled person placards and death certificates falls within the ambit of SOP laws. But the ability to sign such documents is only relevant in limited situations. The two most important—and two most studied—aspects of NP practice governed by SOP laws are physician oversight requirements and prescriptive authority.

Physician Supervision Requirements

At their most basic level, physician oversight requirements come in two categories: (1) some amount of physician involvement in an NP's practice is required and (2) an NP may practice independently of any physician involvement. Within the first category, states differ in how they require physician involvement in NPs' practices. States may require physician "supervision" of NP practices or they may require that NPs "collaborate" with physicians as a condition of treating patients. While the details of a "collaboration" system generally differ from the details of a

"supervision" system, neither system permits an NP to provide healthcare without physician involvement.

Many states require that a physician's involvement with an NP practice be reduced to writing, and the final document may need to be filed with the state board of nursing or medicine or kept on file at the NP's place of business. Some states require collaborative practice agreements (CPAs). A CPA is a written statement that defines the joint practice of an NP and a physician. The CPA specifies the rights and responsibilities of each party along with the requirements for physician consultation. Additionally, some states require written protocols as part of the CPA. These protocols outline the specific details of the NP practice such as the medical conditions the NP may treat, the treatments that may be provided, and the drug therapies that may be prescribed.

Collaboration and supervision often come with legislated administrative responsibilities including chart review, chart certification, and on-site supervision requirements. The specific nature of these requirements may be relevant for individual providers,[4] but the existence of some or all of these legally mandated responsibilities is key for economic and public health outcomes in general. The legal requirement of maintaining a relationship with a physician—even if the specifics of the relationship are not particularly arduous—necessarily tethers NPs to physicians and undermines their ability to compete in markets for healthcare services. Accordingly, whether physician involvement is legally mandated as "collaboration" or "supervision" matters relatively little: both forms of involvement have the same legal effect.

[4] It is relevant to note that though, there is no systematic evidence suggesting that providers actually comply with these requirements.

Prescriptive Authority

Laws governing prescriptive authority determine what medications NPs may prescribe to patients. Prescription drugs are classified into two main groups of controlled and non-controlled substances. Under the Controlled Substances Act,[5] drugs may be placed on one of five schedules depending on their potential for abuse and accepted medical uses. Drugs placed on schedule I have a high potential for abuse and no accepted medical uses. Heroin, for example, is a schedule I controlled substance. No provider may legally prescribe a schedule I controlled substance. Drugs placed on schedule II similarly have a high potential for abuse but have some medical uses. Examples of schedule II controlled substances include many opioids, such as morphine and fentanyl. Schedules III through V include drugs that have accepted medical uses and are organized in declining order of potential for abuse. For example, anabolic steroids are schedule III controlled substances and pregabalin is a schedule V controlled substance that can treat certain types of seizures. Non-controlled substances that still require a prescription are also referred to as legend drugs. These have a low potential for abuse and include drugs such as antibiotics, asthma medications, insulin, and blood pressure medications (USDOJ 2006).

Classifying NP SOP laws pertaining to prescriptive authority presents a different set of challenges than classifying physician oversight requirements. These challenges stem from differences in how medications themselves are regulated. One option is to classify NP prescriptive authority as including all medications other than schedule I controlled substances or not. This option, however, faces several problems. First, certain drugs—such as buprenorphine and clozapine—require all providers to obtain additional certifications to prescribe them. Second, some states permit providers to recommend cannabis—a schedule I controlled substance—and some

[5] See 21 U.S.C. § 801 et seq.

states treat NPs and physicians differently in their ability to recommend it. Third, some states restrict NPs from prescribing very specific medications (such as weight loss drugs). Complicating this problem is the fact that many states have their own version of the federal Controlled Substances Act, and states need not perfectly duplicate the federal scheduling process.

Given these issues, simply classifying NPs as being allowed to prescribe all non-schedule-I drugs or not may not yield an entirely accurate classification. A clearer approach is to consider what NPs may prescribe and the supervision requirements for prescribing. Defining NP prescriptive authority in this way avoids the problem that laws unrelated to SOP may impact the ability of NP to prescribe certain medications. This approach is also consistent with the goals of research that seeks to evaluate the impact of NP-specific restrictions on the ability of NPs to provide care.

Literature Review

Table 1 lists 17 studies from the economics, legal, and public health literatures that evaluate the effects of changing state SOP laws for NPs and other APRNs on a variety of related outcomes. Table 1 does not contain an exhaustive list, rather it reports recent high-quality studies that utilize difference-in-difference methodologies to draw conclusions. The studies covered use either state-based panel data sets or individual-level datasets that span multiple years. There are a number of additional studies published on the topic that rely on identification via cross-sectional variation, but these are excluded since these studies do not address the endogeneity of SOP laws in the analyses.

The focus of Table 1 is how each study classifies the SOP laws. Column 1 indicates how laws are classified when the study or models within the study considers only practice authority.

Column 2 is similar but pertains to studies or models that only consider prescription authority. Column 3 indicates studies or models that combine practice and prescription authority into one measure such as FPA. In columns 4 and 5 we present the data sources and main results, respectively. Note that we use the term "full practice authority" when the law specifies that APRNs practice without oversight from physicians in both practice and prescription authorities. We use the term "independence" when a SOP law does not require any oversight from a physician in practice authority or in prescription authority, but not jointly.

The different coding schemes used in this literature can be summarized as follows: (1) Practice authority only, (2) Prescription authority only, (3) Controlled substances allowed, (4) Practice authority and prescription authority included in models separately, and (5) Practice authority and prescription authority considered jointly. Of the 17 studies in the list, 4 studies examine either only practice authority in the models, or include practice and prescription authority separately. This coding scheme may result in a misclassification or misrepresentation of how the laws work in practice depending on the outcome (including both health outcomes and labor market outcomes) under consideration. Focusing on practice authority and prescriptive authority jointly will often be necessary. Since a nurse's job is to diagnose and treat, and treatments often include prescribing, it often will not make sense to evaluate practice authority in the absence of prescription authority. Note that some state laws allowed independent practice if the NP did not prescribe. For example, Arizona permitted this type of independent practice prior to 1999, and Arkansas currently allows independent practice if the NP does not prescribe. Understanding the effects of independent practice authority is relevant, but it is important not to conflate this with full practice authority. In addition, entering practice authority and prescription authority separately into the models can be

problematic when states change both simultaneously as often does, especially when moving to FPA. This can lead to a problem of multicollinearity.

Six studies include models that examine prescription authority only. Four of these studies model this authority as independence in prescription, while two model it as the ability to prescribe controlled substances regardless of oversite requirements. There is no instance of a state law granting independence in prescription authority without granting independent practice authority so independence in prescription implies independence in practice. However, states do vary as to whether NPs can prescribe controlled substances, and if so, up to what schedule. In general, granting NPs authority to prescribe a narrower range of medications than physicians would not be considered FPA since the limitation on prescription drugs is not reflective of the education and training received by NPs. Hawaii is an example here. Until 2009, the state granted independence in practice and prescription authorities so long as no controlled substances were prescribed. Otherwise, collaborative practice agreements with protocols were required. Regarding the two studies (Perry 2012 and Stange 2014) that examine whether or not prescription of controlled substances is allowed regardless of oversight requirements, it is not clear that this dimension yields results that are comparable or relevant to the policy debate regarding full practice authority.

Five studies examine FPA versus less than FPA. This distinction is the most relevant for the current policy debate regarding the movement to FPA. However, this trend is fairly recent and may not provide enough variation for studies using older data. In addition, using the category of less than FPA results in the loss of information within those state laws. In other words, states that require only a CPA are lumped together with states that require a practice protocol or may not allow controlled substance prescriptions. Although we do not present this finer level of detail in

the table of laws below, we urge researchers to consider whether these details are relevant to and important for the outcomes and time periods under consideration.

Each categorization scheme has advantages and disadvantages. Before offering recommendations on the best approaches, however, it is important to accurately identify which law was in place in each state and year. And prior studies have not always relied on accurate sources of legal information when classifying laws.

Classifying Scope of practice Laws

When classifying SOP laws, many studies rely on the Nurse Practitioner Annual Legislative Update (NPALU) as the source for the SOP laws. This source publishes annual state-by-state summaries of SOP laws pertaining to practice, reimbursement, and prescription. While this source offers a long history of changes to SOP laws—the first version was published in 1989—it is not aimed at researchers. The publication offers insights for practicing NPs and for those engaged in political activities to change SOP laws. Using this publication in research presents salient problems. The enactment dates given in the publication may not necessarily coincide with the dates that certain laws become effective—the publication provides dates that laws were passed in some instances. It also does not appear to track all sources of law for all states. The annual updates sometimes refer to changes in rules and regulations—in addition to statutes—but not every regulatory change is captured by the annual updates. Our goal is not to criticize this source—it offers valuable information that appears to be quite useful to its primary audiences. We only mean to highlight some potential problems with using the annual updates as the sole source of SOP law changes for the purpose of academic research into the effects of the laws on related outcomes.

Indeed, having independently classified state laws ourselves, we are sympathetic to the difficulties of accurately classifying SOP laws over 51 jurisdictions and multiple decades. To begin to fill the need for a consistent legal classification scheme based on the review of statutes, regulations, and court cases, we have compiled a new categorization of state SOP laws. Our categorization meets the need for a consistent classification scheme that is based on statutes, regulations, and court cases and that aligns with current policy discussion, i.e., FPA and the components of FPA.

Table 2 presents our classification of the SOP laws pertaining to NPs from 1998 to 2020. It includes the month and date a state first granted NPs FPA, current statutory and regulatory citations, and notes about state laws that researchers working on specific questions may find useful.[6] Our data sources are state statutes and state board of nursing rules and regulations. We begin our classification in 1998 because, prior to 1998, Medicare did not directly reimburse NPs for their services. Instead, Medicare paid them only for services provided incident to physician services, and many private insurers maintained similar restrictions. Thus, NPs were effectively tethered to physicians under federal law even if state law granted them autonomy. This means that any effects of state law changes prior to 1998 would be muted by federal law. Following the passage of the Balanced Budget Act of 1997, Medicare (and many private insurers) began directly reimbursing NPs, thereby cutting the federal-law tether to physicians (Frakes and Evans 2006).

In Table 2, states are classified as granting NPs FPA if they do not legally mandate any form of supervision by or collaboration with physicians as a condition of NPs practicing and they do not restrict the prescriptive authority of NPs. If a state requires either supervision or collaboration (with or without written protocols), it is classified as restricting the practices of NPs.

[6] These notes are particularly relevant for certain states, like Maryland, that could arguably be coded as granting FPA at different times.

Similarly, if a state does not grant NPs prescriptive authority without requiring physician supervision, it is not classified as granting FPA. If a state has allowed NPs to practice with FPA since before 1998, it is classified as always allowing FPA. If a state has never granted NPs FPA between 1998 and 2020, Table 2 states that directly. For those states that have changed their laws since 1998 to grant FPA, Table 2 reports the month and year that the relevant statute or regulation first became effective.

It is relevant to note that this effective date may differ from the date the legislature passed the bill and the date the governor signed the bill. Additionally, the legal effective date for statutes may not match the practical effective date. For example, many states require state agencies or boards to pass regulations or implement new application or certification systems to fully implement FPA statutes. In these states, NPs may not acquire FPA in practice until several months after the legal effective date of the relevant statute.

Table 2 focuses on NPs since they are the largest group (76 percent) of APRNs (BLS 2018). While some types of occupational licensing laws often apply to all four types of APRNs—NPs, CNMs, CNSs, and CRNAs—this is not generally true of laws conferring independent practice authority and full prescriptive authority. We recommend that any researcher focusing on CNMs, CNS, and CRNAs conduct the legal research relevant and specific to the nurses and outcomes under consideration. We would like to note, however, that CNMs are often treated the same or similarly as NPs, whereas CNSs and CRNAs are often treated quite differently.

Table 2 does not specifically include information on whether NPs must sign collaborative practice agreements, supervision agreements, or protocols as a condition of practicing. Legally, these are different mechanisms by which states require physician involvement in NP practices and all amount to requiring physician supervision of NPs, even if they use slightly different language

and intend a slightly different connotation. However, researchers focusing on questions in certain contexts may want to consider the nature of the collaborative practice agreements required by the states of interest. The nature of these agreements may differ in different contexts, e.g., rural health clinics and hospitals.

In general, the SOP-law classification reported in Table 2 represents the best available information on which states maintained specific SOP laws in the first two decades of this century. To demonstrate that this information is the best available, we provide current statutory and regulatory citations to current SOP laws in Table 2. These citations can be used as the basis for both validating and updating the coding of SOP laws. A comparison of the laws and dates presented in Table 2 with those used in prior work will reveal a number of differences. Our goal in providing a consistent coding of laws is not to highlight errors in prior work. As noted above, finding, parsing, and coding the laws of 51 jurisdictions over several decades is a highly complex legal task. Instead, our primary goal is to provide a single source of information that will allow future work to clearly and consistently identify when different states granted FPA to NPs. This source of information will not only provide a sound legal foundation for future empirical work but will also facilitate comparisons of results across studies. If more researchers adopt a consistent coding scheme, it will be easier for researchers and policymakers to understand and compare the results of disparate studies.

Recommendations for Researchers

As researchers continue to investigate the role of SOP laws in the provision of healthcare and the labor markets for healthcare providers, several recommendations may facilitate the generation of accurate empirical results that are both policy-relevant and comparable across

studies. As noted above, our recommendations here pertain to researchers focusing on NPs (and CNMs). Researchers focused on CRNAs and CNSs (as well as other healthcare providers like physician assistants) will need to conduct additional legal research.

Our first major recommendation for researchers focused on NPs is to consider using the legal classification scheme outlined above. Using both the practice authority and prescriptive authority classifications, researchers will be able to examine the primary policy levers that are currently under discussion.

Our second major recommendation concerns how the classification scheme described above is deployed. For most outcomes, researchers will likely want to consider a variable that identifies states with FPA (a state grants NPs independence and full prescriptive authority). For example, when focusing on labor market outcomes, a joint variable for full practice authority is likely to be most appropriate since labor market decisions are often based on all characteristics of the job, rather than one aspect such as prescription authority.[7] When focused on medical care and health outcomes, the choice of examining the joint variable or the separate variables will depend on the outcome under consideration. For example, analyzing the effect of NP SOP laws on the price or use of common medical examinations (such as pediatric visits) may require considering full practice authority since these services tend to include diagnoses and pharmaceuticals. For other outcomes, such as medication errors or opioid overdoses, understanding the different effects of independence and full prescriptive authority might be important and could require a separate consideration of NP independence and a more detailed description of prescriptive authority. The one caveat here is that some states have changed practice and prescription authorities simultaneously so including these as separate variables in linear regression models could result in

[7] See Markowitz and Adams (2020) for a detailed discussion of SOP on labor market decisions.

a multicollinearity problem. Researchers should carefully consider which mechanisms of effect they are attempting to isolate and consider which coding scheme is most appropriate for their study setting.

Third, and relatedly, as researchers develop their projects, they should determine whether additional legal information is required. For some outcomes, other laws may interact with SOP laws in important ways. Identifying these other laws and how they may modulate the effect (or not) of NP SOP laws is an important preliminary step in all studies. In many cases, no other relevant laws will exist. But in some cases—often those of most interest to researchers—other legal regimes may be relevant. Examples include medical liability laws, laws pertaining to reimbursement, and SOP laws for other practitioners. Understanding these other regimes is important both for designing a study correctly (e.g., controlling for other relevant factors) and for interpreting the results of the study.

Fourth, we recommend that researchers adopt a more consistent terminology. For various reasons, different ways to describe essentially the same law have emerged. Our intent is not to blame researchers for using different terminology—there are often good editorial reasons to do so. Rather, we hope to encourage the development of consistency so that studies can more easily be compared to one another. We recommend the term "full practice authority" be used to describe SOP that does not legally mandate any form of supervision by or collaboration with physicians as a condition of NPs practice including prescription authority. We also recommend that researchers be clear when describing independence in one aspect of practice or prescription but not both.

Our final recommendation concerns SOP requirements that are not based in law. An emerging trend in the SOP literature is to examine the effects of hospital- or clinic-imposed requirements on APRNs (Pittman et al. 2020). These institutions often have authority to restrict

the practices of APRNs to a greater extent than state law does. These restrictions are necessarily based on the contracts that exist between APRNs and these institutions and should not be treated as interchangeable with statutes and regulations. One important reason for this is that the restrictions will only apply at the relevant institution and would not affect the APRN at other places of practice. Another important reason concerns the interpretation of these restrictions, which will necessarily occur under contract law. Courts may use similar legal tools when interpreting contracts, statutes, and regulations, but contract interpretation is nonetheless different than statutory or regulatory interpretation. Thus, a requirement imposed by statute may have a different impact than the same requirement imposed by a healthcare institution via contract. We do not mean to suggest that institution-specific SOP requirements are unimportant; we only mean to caution against treating these requirements the same as SOP laws.

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Tables and Figures

Table 1: Literature

Study	SOP Law Separate—Practice Authority (PA)	SOP Law Separate—Prescription Authority (RX)	SOP Law PA and RX both included	SOP Data Source and Years Included	Main findings
Alexander and Schnell (2019)		Independent		NPALU, state nursing boards, state statutes 1990-2014	No effect on suicides. Independent RX associated with fewer mental health related deaths, fewer days in poor mental health. Mixed results for prescription rates.
Grecu and Spector (2019)		Independent for schedule II CS		State statutes, 2003-2015	No effect on opioid treatment admissions nor mortality unless combined with a prescription drug monitoring program.
Kandrack et al. (2019)			FPA	NPALU, 2010-2017	No effect on nurse supply
Kleiner et al. (2016)	Independent	Mutually exclusive categories: • Independent • Supervised/delegated (CS only under supervision) • Limited (no CS, legend under supervision		NPALU, 1999-2010	Independent PA: increased NP earnings, no effects on hours Independent RX: no effect on NP earnings, increased hours, lower price for well-child visits, no effect on

					infant mortality; no effect on physician malpractice insurance
Kurtzman et al. (2017)	Independent (no restrictions + sole authority by BON)	Independent		NPALU, 2006-2011	No differences in quality of care associated with either independence in PA or independence in RX
Markowitz et al. (2017)			Mutually exclusive categories for CNMs: • FPA • CPA • CPA with protocols • Supervisory, no RX.	NPALU, state statues	No difference in maternal health behaviors; FPA associated with small increases in infant health outcomes and fewer labor inductions and C-sections; no effects on labor supply of CNMs
McMichael, Safriet, and Buerhaus (2018)	Independent		• FPA • Physician supervision required only for RX • Complete supervision	State statutes, regulations, and court cases, 1999-2012	Independent in PA and RX associated with reduced physician malpractice liability
McMichael (2018)	Independent	• CS allowed • Limited RX authority	• FPA • Physician supervision required only for RX • Complete supervision	State statutes, regulations, and court cases, 2001-2003; 2010-2015	Independent in PA and RX associated with increased supply of NPs

McMichael, Spetz, and Buerhaus (2019)			FPA	State statutes, regulations, and court cases, 2006-2015	Independent in PA associated with smaller increase in emergency department use following Medicaid expansion
McMichael (2020a)			FPA	State statutes, regulations, and court cases, 1998-2015	FPA and malpractice liability interact to affect C-sections and inductions
McMichael (2020b)			FPA	State statutes, regulations, and court cases, 2011-2018	FPA associated with decrease in opioid prescriptions
Muench et al. (2020)			FPA	NPALU, state nursing boards, state statutes 2008-2012	FPA associated with a small increase in medication adherence.
Perry (2012)		CS allowed (Y/N), regardless of oversight requirements		NPALU, 1991-2003	NPs less likely to move from a state with CS authority
Spetz et al. (2013)			Independent in PA Independent in RX	NPALU, 2004-2007	Independent in PA only associated with fewer RX payments and RX filled in retail clinics. Independent in PA and RX associated with higher RX payments and more RX filled in retail clinics
Stange (2014)		CS allowed (Y/N), regardless of oversight requirements		NPALU, 1996-2008	CS RX allowed is associated with more office visits. No

					effects on usual source of care and amount paid.
Timmons (2017)		Mutually exclusive categories: • CS without supervision • CS with supervision • No CS		NPALU, 1999-2012	No effects on claims, care days, RX claims
Traczynski and Udalova (2018)			FPA	NPALU, state statues, BON rules and regulations, 1995-2012	FPA associated with: decreased emergency room visit; increased appointment availability; increases in quality of care metrics

Table 2: Nurse Practitioner Scope of Practice Laws, 1998–2020

State	FPA Status 1998-2020[a]	Practice Citation	Prescription Citation	Controlled Substances	Independence in Practice if no RX	Notes
Alabama	Never	Code of Ala. § 34-21-85. *Id.* § 34-21-86.	Code of Ala. § 34-21-86.	Allowed as of Aug. 2013		
Alaska	Always[b]	Alaska Admin. Code tit. 12, § 44.430. *Id.* § 44.445.	Alaska Admin. Code tit. 12, § 44.440.			
Arizona	December 1999	Ariz. Rev. Stat. § 32-1601(22). *Id.* § 32-1651.	Ariz. Rev. Stat. § 32-1651.		Allowed prior to Dec. 1999.	Arizona includes some restrictions on opioid prescribing. Independence in practice without prescribing was allowed prior to 1999 but still required the establishment of a relationship with a physician for consultation or referral. The physician's name had to be submitted to the Board of Nursing even though no collaboration agreement was required.
Arkansas	Never	067-00 Ark. Code R. § 003. *Id.* § 004(VIII).	067-00 Ark. Code R. § 004(VIII).		Yes	
California	Never	Cal. Bus & Prof Code § 2835.7. *Id.* § 2836.1.	Cal. Bus & Prof Code § 2836.1.			California passed a bill in 2020 to grant NPs FPA, but the law is not yet effective.
Colorado	July 2010	Colo. Rev. Stat. § 12-38-111.5. *Id.* § 12-255-112.	Colo. Rev. Stat. § 12-255-112.			
Connecticut	July 2014	Conn. Gen. Stat. § 20-87a.	Conn. Gen. Stat. § 20-87a.			
Delaware	September 2015	Del. Code Ann. tit. 24, § 193.	Del. Code Ann. tit. 24, § 1935.			
District of Columbia	Always[b]	D.C. Code § 3-1206.01.	D.C. Code § 3-1206.01.			
Florida	July 2020	Fla. Stat. Ann. § 464.0123.	Fla. Stat. Ann. § 464.012.	Allowed as of Jan. 2017		Only NPs engaged in "primary care practice, including family medicine, general pediatrics, and general internal medicine" may practice independently of physicians.

Georgia	Never	Ga. Code Ann. § 43-34-25.	Ga. Code Ann. § 43-34-25.			
Hawaii	July 2009	Haw. Rev. Stat. Ann. § 457-2.7. *Id.* § 457-8.6.	Haw. Rev. Stat. Ann. § 457-8.6.	Allowed as of April 2005	Prior to July 2009, independent in practice if no RX and document a collegial working relationship with MD.	
Idaho	July 2004	Idaho Code § 54-1402(1).	Idaho Code § 54-1402(1).			
Illinois	January 2018	225 Ill. Comp. Stat. Ann. 65/65-43.	225 Ill. Comp. Stat. Ann. 65/65-40.	NPs can only prescribe benzodiazepines and schedule II narcotics in "consultation" with a physician (same bill from January 2018)		
Indiana	Never–See Note	Ind. Code Ann. § 25-23-1-19.4.	Ind. Code Ann. § 25-23-1-19.5.			Indiana allows NPs to practice with "all of the supervisory rights and responsibilities, including prior authorization, that are available to a licensed physician or a health service provider in psychology (HSPP) operating in a community mental health center" when providing care to Medicaid patients.
Iowa	Always[b]	Iowa Code § 152E.3.	Iowa Code § 147.107.			
Kansas	Never	Kan. Stat. Ann. § 65-1130.	Kan. Stat. Ann. § 65-1130(d).			
Kentucky	Never	Ky. Rev. Stat. Ann. § 314.042.	Ky. Rev. Stat. Ann. § 314.042(10).	Allowed as of August 2006	Can prescribe nonscheduled drugs independently after 4 years of experience prescribing nonscheduled drugs in collaboration with a physician.	

Louisiana	Never	La. Stat. Ann. § 37:913.	La. Stat. Ann. § 37:913(8).			
Maine	Always[b]	Me. Rev. Stat. Ann. tit. 32, § 2102. *Id.* § 221; Me. Code of Regs. §02.380.008;	Me. Rev. Stat. Ann. tit. 32, § 2210.			
Maryland	October 2010–See Note	Md. Code Ann., Health Occupations § 8-302.	Md. Code Ann., Health Occupations § 8-512(a)(2).			Prior to Oct 1 2010, NPs had collaborative agreements. As of Oct 1 2010, NPs must file an attestation form with the state that declares the NP will collaborate with a named physician and will adhere the rules governing the scope of practice for their certification, but the attestation does not require the physician collaborator's signature and, once filed, NPs may practice independently. The requirement for attestation was eliminated Oct 1 2015.
Massachusetts	Never	Mass. Ann. Laws ch. 112, § 80E. 244 Mass. Code Regs. 4.02.	1397 Mass. Code Regs. 57(2.10).			
Michigan	Never	Mich. Comp. Laws Serv. § 333.17211a.	Mich. Comp. Laws Serv. § 333.17211a.		Physician delegation no longer required for nonscheduled drugs as of April 2017	
Minnesota	January 2015	Minn. Stat. § 148.235.	Minn. Stat. § 148.235.			
Mississippi	Never	Miss. Code Ann. § 73-15-20.	Miss. Code Ann. § 73-15-20.	Allowed as of July 1 2002		
Missouri	Never	Mo. Rev. Stat. § 334.104.	Mo. Ann. Stat. § 334.104.			
Montana	Always[b]	Mont. Code Ann. § 37-8-409.	Mont. Admin. R. 24.159.1461.			
Nebraska	March 2015	Neb. Rev. Stat. Ann. § 38-2315.	Neb. Rev. Stat. Ann. § 38-2315.			

Nevada	July 2013	Nev. Rev. Stat. Ann. § 632.237. *Id.* § 639.1375. *Id.* § 639.2351.	Nev. Rev. Stat. Ann. § 639.1375.	Allowed as of May 2001		Cannot prescribe schedule II drugs unless 2 years/2000 hours clinical experience OR unless controlled substance is prescribed pursuant to a protocol approved by a collaborating physician.
New Hampshire	Always[b]	N.H. Rev. Stat. Ann. § 326-B:11.	N.H. Rev. Stat. Ann. § 326-B:11.			
New Jersey	Never	N.J. Stat. Ann. § 45:11-49.	N.J. Stat. Ann. § 45:11-49.	Allowed as of August 2004		
New Mexico	Always[b]	N.M. Stat. Ann. § 61-3-23.2.	N.M. Stat. Ann. § 61-3-23.2.			
New York	January 2015–See Note	N.Y. Educ. Law § 6902.	2020 N.Y. CLS Educ Consol. Laws Adv. Legis. Serv. § 6902(3).			As of Jan. 2015, NPs need to attest to a collaborative relationship with a physician, but are otherwise independent in practice and prescriptive authority. Local NPs interpret the 2015 change in the law as allowing full practice authority (Poghosyan et al. 2020).
North Carolina	Never	N.C. Gen. Stat. § 90-18.2.	N.C. Gen. Stat. § 90-18.2.			
North Dakota	October 2011	N.D. Cent. Code § 43-12.5-01.	N.D. Admin. Code 54-05-03.1-03.			
Ohio	Never	Ohio Rev. Code Ann. § 4723.43.	Ohio Rev. Code Ann. § 4723.50.			
Oklahoma	Never	Okla. Stat. tit. 59, § 567.3a(6).	Okla. Stat. tit. 59, § 567.4a.			
Oregon	Always[b]	Or. Rev. Stat. § 678.375(4).	Or. Rev. Stat. § 678.390.			
Pennsylvania	Never	63 Pa. Cons. Stat. § 218.2. *Id.* § 218.3.	63 Pa. Cons. Stat. § 218.3.			
Rhode Island	Feb 2012	216-RICR-40-05-3	R.I. Gen. Laws § 5-34-49.			Regulations granting full practice authority were promulgated in January/February 2012. Rhode Island changed its statute to allow full practice authority in June 2013. 5 R.I. Gen. Laws § 5-34-44.
South Carolina	Never	S.C. Code Ann. § 40-33-34.	S.C. Code Ann. § 40-33-34.	Allowed as of May 2004		

South Dakota	February 2017	S.D. Codified Laws § 36-9A-12.	S.D. Codified Laws § 36-9A-12.			
Tennessee	Never	Tenn. Code Ann. § 63-7-123.	Tenn. Code Ann. § 63-7-123.			
Texas	Never	Tex. Occ. Code Ann. § 157.0512.	Tex. Occ. Code Ann. § 157.0512.	Allowed as of May 2003		
Utah	May 2016	Utah Code Ann. § 58-31d-102.	Utah Code Ann. § 58-17d-102(23).		Yes–See note	Prior to May 2016, independent in practice and prescription only for schedules IV and V. Schedules II and III require a consultation and referral plan with a consulting physician.
Vermont	June 2011	Vt. Stat. Ann. tit. 26, §§ 1611, 1613.	04-030-170 Vt. Code R. § 8.5.			
Virginia	April 2018	Va. Code Ann. § 54.1-2957. *Id.* § 54.1-2957.01.	Va. Code Ann. § 54.1-2957.01.	(i) Schedules V and VI controlled substances on and after July 1, 2000; (ii) Schedules IV through VI on and after January 1, 2002; (iii) Schedules III through VI controlled substances on and after July 1, 2003; and (iv) Schedules II through VI on and after July 1, 2006		
Washington	July 2005–See notes	Wash. Rev. Code Ann. § 18.79.050.	Wash. Rev. Code Ann. § 18.79.050.	Prior to July 1, 2000, Schedule V and legend		Prior to July 2005, a joint practice agreement was required for controlled substance prescriptions. The JPA is a written agreement that describes how collaboration will occur between the physician and the

				drugs only. Effective July 1, 2000, schedules II-IV allowed.		ARNP (i.e. when and how the ARNP will consult regarding the Rx of controlled substances).
West Virginia	June 2016	W. Va. Code Ann. § 9-4B-1. *Id.* § 30-7-15b.	W. Va. Code Ann. § 30-7-15b.	Schedule II not allowed.		
Wisconsin	Never	Wis. Stat. § 961.395. *Id.* § 441.16.	Wis. Stat. § 961.395 (2020); Wis. Stat. § 441.16.			
Wyoming	Always[b]	Wyo. Stat. Ann. § 33-21-302.	Wyo. Stat. Ann. § 33-21-120(a)(i)(A).	Authority to prescribe Schedule II controlled substances effective July 1 2001.		

[a] Some states require a transition to practice period that requires an NP to be supervised for some amount of time before being granted full practice authority.

[b] State has always allowed full practice authority since at least 1998.