

The Impact of Full Practice Authority for Nurse Practitioners and Other Advanced Practice Registered Nurses in Ohio

Grant R. Martsof, David I. Auerbach, Aziza Arifkhanova

Sponsored by the Ohio Association of Advanced Practice Nurses



For more information on this publication, visit www.rand.org/t/rr848

Published by the RAND Corporation, Santa Monica, Calif.

© Copyright 2015 RAND Corporation

RAND® is a registered trademark.

Limited Print and Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law. This representation of RAND intellectual property is provided for noncommercial use only. Unauthorized posting of this publication online is prohibited. Permission is given to duplicate this document for personal use only, as long as it is unaltered and complete. Permission is required from RAND to reproduce, or reuse in another form, any of its research documents for commercial use. For information on reprint and linking permissions, please visit www.rand.org/pubs/permissions.html.

The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

Support RAND

Make a tax-deductible charitable contribution at
www.rand.org/giving/contribute

www.rand.org

Preface

Advanced practice registered nurses (APRNs) play a large and expanding role in the American health-care delivery system. Many states are considering relaxing scope-of-practice (SOP) laws to allow APRNs to independently provide more-extensive services to their patients. The purpose of this report is to review the extant literature on the effect of relaxing APRN SOP laws on health-care access, quality, and costs. Informed by the effect estimates in the literature, we demonstrate the specific effects that expanded SOP for APRNs might have for the state of Ohio. We intend this report to help legislators, professional associations, and other interested stakeholders (particularly those in the state of Ohio) understand the potential impact of expanded SOP laws. Sponsored by the Ohio Association of Advanced Practice Nurses, the work reported here was conducted in RAND Health, a division of the RAND Corporation. A profile of RAND Health, abstracts of its publications, and ordering information can be found at <http://www.rand.org/health>.

Contents

Preface.....	iii
Contents	v
Tables.....	vii
Summary.....	ix
Abbreviations.....	xi
Chapter One. Introduction	1
Chapter Two. Literature Review.....	3
Access and Utilization.....	5
Access and Utilization Summary	6
Quality and Outcomes	7
Quality and Outcomes Summary	7
Costs	7
Cost Summary	8
Application of Results to Certified Registered Nurse Anesthetists, Certified Nurse-Midwives, and Clinical Nurse Specialists	9
Certified Registered Nurse Anesthetists.....	9
Certified Nurse-Midwives.....	9
Clinical Nurse Specialists.....	10
Chapter Three. Ohio-Specific Impacts	11
Access and Utilization.....	12
Quality and Outcomes	13
Costs	14
Chapter Four. Conclusion.....	17
Appendix: Literature Review Methods and Detailed Findings	19
References.....	21

Tables

Table 2.1. Summary of Results upon Changing Scope-of-Practice Laws from Restrictive to Full Practice Authority	5
Table 3.1. Change in the Number of Adults Who Would Receive Preventive-Care Visits in Ohio After a Change in the Scope-of-Practice Laws.....	13
Table 3.2. Change in Number of Ohio Residents Reporting on Three Measures of Access to Care	13
Table 3.3. Change in Number of Ambulatory Care–Sensitive Emergency-Department Visits ...	14
Table 3.4. Change in Ohio Residents’ Reporting on Quality of Care	14
Table 3.5. Change in Total Health Expenditure for Office Visits After Relaxation of Scope-of-Practice Laws	15
Table A.1. Summary of Primary Studies Included in the Literature Assessment	20

Summary

Advanced practice registered nurses (APRNs) make up the fastest-growing segment of the primary care professional workforce in the United States. States are considering relaxing scope-of-practice (SOP) laws for these APRNs as a potential approach to improve access to care, maintain or enhance care quality, and decrease overall health-care costs. Previous studies have demonstrated that APRNs deliver care that is of equal quality to the care provided by their physician counterparts. As part of an extensive literature review, we identified three high-quality studies addressing the impact that expanded SOP could have on health-care access, quality, and costs. Informed by this review of literature, we describe the potential effect of removing SOP restrictions for APRNs in the state of Ohio. Our review of the literature and effect estimates demonstrate that granting APRNs full practice authority would likely increase access to health-care services for Ohioans, with possible increases in quality and no clear increase in costs.

Abbreviations

AAFP	American Academy of Family Physicians
ACS	ambulatory care–sensitive
AMA	American Medical Association
APRN	advanced practice registered nurse
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CNM	certified nurse-midwife
CNS	clinical nurse specialist
CRNA	certified registered nurse anesthetist
ED	emergency department
MEPS	Medical Expenditure Panel Survey
NP	nurse practitioner
PCMH	patient-centered medical home
SOP	scope of practice

Chapter One. Introduction

State scope-of-practice (SOP) laws govern the procedures and actions that licensed health-care providers can perform. These laws establish the breadth of health-care procedures and services that health-care providers are licensed to provide under state law. In the case of advanced practice registered nurses (APRNs) (i.e., certified nurse-midwives [CNMs], nurse practitioners [NPs], certified registered nurse anesthetists [CRNAs], and clinical nurse specialists [CNSs]), the rules establish both the range of services APRNs may deliver and the extent to which APRNs are permitted to practice without physician supervision (Gilman and Koslov, 2014). State SOP laws specify, for example, whether APRNs can write certain kinds of prescriptions with or without physician supervision or sign-off, or how many miles APRNs must be located from their supervising (or collaborating) physician. Although the accreditation, education, and certification processes for APRNs have become standardized across the nation, SOP laws for APRNs retain considerable state-to-state variation.

Some advocates and policymakers have argued that restrictive SOP laws for APRNs could unnecessarily limit the supply of health-care services without appreciably affecting quality or outcomes of care (Dower, Moore, and Langelier, 2013). The concern that demand could outstrip supply is especially acute as the population ages, more people live with conditions, and more Americans obtain health insurance under the Patient Protection and Affordable Care Act (Pub. L. 111-148, 2010; Petterson et al., 2012). To address this growing demand, the Institute of Medicine's landmark report on the future of nursing recommended that state legislatures and other governments remove SOP barriers, arguing that "advanced practice registered nurses should be able to practice to the full extent of their education and training" (Institute of Medicine, 2010). More recently, Gilman and Koslov (2014) cited the findings of several expert bodies in making the assertion that APRNs "are safe and effective as independent providers of many health-care services within the scope of their training, licensure, certification, and current practice. Therefore, new or extended layers of mandatory physician supervision may not be justified" (p. 2). The National Governors Association has encouraged full practice authority for APRNs and SOP changes to increase efficiencies in the current primary care workforce (National Governors Association, 2012). Furthermore, the National Committee for Quality Assurance recognizes and accredits APRN-led patient-centered medical homes (PCMHs) (National Committee for Quality Assurance, undated).¹

¹ The PCMH is an emerging model of primary care that seeks to provide more-comprehensive, coordinated, and patient-centered care through the adoption of key organizational capabilities, such as team-based care, shared patient communication, use of care managers, use of electronic health records, patient registries, and performance feedback to providers.

Other stakeholders caution against independent APRN practice. For example, both the American Academy of Family Physicians (AAFP) and the American Medical Association (AMA) note that, on average, NPs have fewer years of clinical education and training than physicians and that patients might not fully understand this difference in clinician background when making care choices (AAFP, undated; AMA, 2010). Furthermore, AMA argues that patients prefer to see physicians rather than APRNs (AMA, 2010). Others argue that expanding SOP for APRNs might actually lead to increased costs, arguing that NPs order more laboratory tests, imaging, and specialist visits than physicians do (Jauhar, 2014; Dears, 2014). The AAFP supports the expansion of NP use through innovations, such as PCMHs led by physicians, but argues that NPs should not be permitted to practice independently (AAFP, 2012).

Nationwide, the trend elsewhere in recent years has been toward full practice authority, with an increasing number of states removing SOP restrictions since 2010 (Tolbert, 2013). Although many studies focus on demonstrating that APRNs can deliver high-quality care or comparing the quality of care delivered by APRNs and that delivered by other providers (Laurant et al., 2005; Dulisse and Cromwell, 2010; Newhouse et al., 2011; Johantgen et al., 2012), few studies have focused explicitly on estimating the direct effect that SOP laws have on health-care cost, quality, and access. These estimates can aid legislators in better understanding the specific impacts of changes in SOP laws.

The Ohio Association of Advanced Practice Nurses commissioned this report to better understand the potential impact that relaxing SOP laws could have on health-care access, quality, and costs in the state of Ohio, which has some of the strictest SOP laws in the country. Ohio is one of 25 states that do not allow an NP to practice without a collaborative or supervisory agreement with a physician. In this report, we present the results of a comprehensive literature review assessing the impact that SOP laws can have on health-care cost, quality, and access. Informed by our literature review, we estimated the potential impact on health-care cost, quality, and access if Ohio changed its SOP laws for APRNs to be consistent with those states that allow full practice authority for APRNs. Two recent studies estimated the potential impact of enacting full practice authority for NPs in Texas and California (Perryman Group, 2012; Weinberg and Kallerman, 2014). We improved on the previously published studies by including more-recent literature and utilizing stricter inclusion and exclusion criteria for choosing the studies. Our study is also the first to use the estimates from the published literature to assess the impact of SOP for the state of Ohio.

Chapter Two. Literature Review

We performed a literature review by searching for peer-reviewed studies in the PubMed and Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases. We also used the Google search engine to find gray literature related to nursing and state SOP laws, and we reviewed nurse associations' websites (e.g., the American Nurses Association, State of Ohio Board of Nursing, American Association of Nurse Anesthetists) for other documents pertaining to Ohio's SOP laws. Studies deemed in scope initially were rigorously reviewed for their research designs, provider definitions, data sources, peer-review status, mechanisms of effect, and plausibility of findings. Informed by this review, we decided to focus specifically on quantitative studies that assessed longitudinal changes in SOP laws within a state as opposed to qualitative studies or other studies that performed cross-sectional comparisons across states with varying levels of APRN independence. Cross-sectional studies are susceptible to misestimating the effect of SOP laws by not accounting for other important and unobservable differences across states that could be associated with the key outcomes of interest. Some of the excluded studies are referenced in the result section to illustrate points or provide context but are not used to generate effect estimates.

Furthermore, a relatively large body of literature has assessed the impact of care provided by NPs and by primary care physicians (Laurant et al., 2005; Dulisse and Cromwell, 2010; Newhouse et al., 2011; Johantgen et al., 2012; Tolbert, 2013; Martínez-González et al., 2014), and a smaller number of studies compared care provided by other APRNs with that provided by physicians with overlapping competencies and roles (Dulisse and Cromwell, 2010). However, these studies do not directly assess the effect of SOP laws, so the implications for the effect of SOP laws must be made by inference. Again, although we cited these excluded studies in some instances to illustrate points made in the result section, they did not factor into our estimate of the effects of SOP laws. For detailed information on our literature review methods and the studies we assessed, see the appendix.

After reviewing the literature and evidence of SOP impact, we found no studies that met our inclusion criteria that assessed SOP impact for CNMs, CRNAs, or CNSs. As a result, the bulk of this analysis focuses on NPs, who make up roughly 60 percent of APRNs nationally (Health Resources and Services Administration, 2010). At the end of this report, we discuss how our findings might be extrapolated to other APRNs.

Table 2.1 summarizes the results of our literature assessment. For a detailed summary of the studies included in the assessment (including authors, dates, main outcomes, and additional notes or comments), see the appendix. These results are displayed in three categories: access and utilization, quality and outcomes, and costs. The results of our literature must be interpreted in light of some important limitations. First, these summary results are based on a small number of

studies. Only three studies met our stringent inclusion criteria (Kleiner et al., 2014; Stange, 2014; Traczynski and Udalova, 2014). Only one of those studies is currently published in a peer-reviewed journal (Stange, 2014), while the other two are currently working papers that have been presented at academic conferences and are publicly available (Kleiner et al., 2014; Traczynski and Udalova, 2014). We have included references to other studies throughout to illustrate or provide context for points made in the report, but these other studies were not used to create the literature summaries or the specific impact estimates for the state of Ohio. Despite the limited number of studies, each of the three remaining studies was of extremely high quality using robust national databases.

Also, the studies generally compare states *without* independent practice or prescriptive authority and states *with* independent practice or prescriptive authority, then assess the potential impact that a change in SOP laws would have on those states. In reality, SOP laws vary from state to state, with restrictions ranging from governing the distance (in miles) that supervising physicians must be located from the NP practice site to setting the percentage of charts that must be reviewed, to specifying the time period (or types of drugs) within which prescription or testing orders must be signed off (Lugo et al., 2007; Pearson, 2009). However, for analytic purposes, researchers tend to collapse these gradations into broader categorizations to allow for quantitative assessment and comparison. As a result, many of the estimates offered in the literature simply compare the outcomes of states with SOP restrictions and those of the states with none, rather than distinguishing between degrees of SOP restrictions.

Table 2.1. Summary of Results upon Changing Scope-of-Practice Laws from Restrictive to Full Practice Authority

Aspect of Care	Overall Impact	Impact Summary
Access and utilization	Likely increase	The total amount of care provided to patients in a state would likely increase. One key study finds a 2% increase in the number of office visits when a state's SOP laws are relaxed. Percentage of the population receiving checkups and reporting timely and convenient care should also increase—by as much as 10% or more on some measures.
Quality and outcomes	Possible increase	Evidence suggests that ED visits for ACS conditions goes down, which is a marker of higher-quality primary care. Patients self-report improved health status and experiences of care. Data are suggestive but inconclusive.
Costs	Inconclusive	For services that can be provided by both NPs and physicians, evidence suggests that prices would decrease, particularly in the case of well-child visits. However, as stated previously, utilization will likely increase as access improves. Total costs are the produce of prices and utilization. So, decreasing costs with increasing utilization could lead to increased or decreased costs. In terms of total costs, some categories of spending would likely increase and others decrease. Researchers have found increases in spending on office visits but decreases in ED visits. The cost savings due to reductions in ED visits could be significant compared with increased costs from more outpatient visits. Spending on compliance with SOP laws (e.g., NPs paying supervising physicians or other administrative costs) would be reduced or eliminated. However, no studies to date have estimated the overall effect on costs.

NOTE: *Likely* indicates that theory and all or most empirical studies support an effect in the same direction. *Possible* indicates that evidence is weak or suggestive or studies are limited, but generally in the same direction. *Inconclusive* indicates that some of the evidence would suggest an increase while others would suggest a decrease and there is not enough evidence to suggest an overall effect. ED = emergency department. ACS = ambulatory care-sensitive. A condition is sensitive to ambulatory care if appropriate ambulatory care “could prevent the onset of this type of illness or condition, control an acute episodic illness or condition, or manage a chronic disease or condition. A disproportionately high rate is presumed to reflect problems in obtaining access to appropriate primary care” (National Quality Measures Clearinghouse, 2014).

Access and Utilization

Access to care—the ability to obtain health care when needed, regardless of health status or income—and utilization were addressed in all three studies we analyzed. One way in which removing SOP restrictions would improve access to care is that APRNs would spend less time complying with SOP requirements (e.g., conferring with supervisory physicians) and more time caring for patients. Physicians might also spend less time overseeing APRN work and likewise have more time for patient care, thereby improving access to care.

From the qualitative studies and other informal sources, it is clear that compliance with SOP regulations takes time from both NPs and their supervising physicians (Yee et al., 2013); however, we cannot estimate how much time is used for this purpose because, to our knowledge, no direct time-accounting studies have been conducted to examine this. Furthermore, at least one study found that the supply of APRNs increased upon removal of restrictive SOP laws, perhaps by relocating from other states or from increased entry into APRN educational programs in such states (Kalist and Spurr, 2004).

One quantitative study included in our review, by Kleiner et al. (2014), found that, in states without SOP barriers, NPs work 11 percent more hours per year. The effect of NP SOP restrictions on hours worked by *physicians* was more ambiguous in that two papers on this topic reached contradictory conclusions. Kleiner et al. (2014) found that physicians *reduce* their work hours by 6 percent (because, the authors argued, NPs are providing care that physicians would otherwise provide), while Traczynski and Udalova (2014) found that physicians *increase* their direct patient-care hours by 8 percent (because, the authors said, they spend less time supervising NPs). The source of these contradictory results is unclear.

Traczynski and Udalova (2014) found that the probability of someone 18 or older having had a routine checkup in the past year increased by 3.8 percentage points within two years of a state allowing independent practice and prescribing—a result that increased to 6.8 percentage points 11 years after the law changed. They also found improvements of 10 to 20 percent on other subjective measures of access, such as the extent to which a patient can access a provider when needed, get care when sick, and easily travel to the provider. Furthermore, the magnitude of these improvements is noteworthy given that NPs make up only an estimated 20 percent of U.S. primary care providers (Johnson et al., 2012). Finally, although not included in our formal literature review, Richards and Polsky (2014) suggested that practices in states with full practice authority were 20 to 30 percent more likely than states without full practice authority to accept Medicaid patients.

Complying with restrictive SOP requirements, which requires physician collaboration or supervision, could be more difficult in areas with fewer potential collaborating physicians (e.g., in rural regions or at nurse-led or retail clinics). In addition, physicians are increasingly being employed by hospitals (Merritt Hawkins, 2014), and physicians working for a particular health system are often restricted from entering regulated relationships with NPs who are not also employees of the same health system. Furthermore, trends show that very small percentages of physicians are entering primary care residencies (AAFP, 2014), so the ratio of physicians to NPs in primary care is likely to shrink from 4.1:1 in 2010 to 2.3:1 in 2025 (Auerbach, 2012). This makes it difficult in many areas of the country for NPs to find collaborating or supervisory physicians in primary care. Thus, the impact that SOP laws have on access to care should theoretically be greater in areas where finding a collaborating physician is more challenging. However, neither the Stange (2014) study nor the Traczynski and Udalova (2014) study found a differential impact in rural areas.

Access and Utilization Summary

Moving toward full practice authority for NPs would likely increase access to care. Experts have theorized that NPs would spend less time complying with SOP requirements and more time on patient care, although, because we have insufficient data, how much more time is unclear. NPs also could relocate to or be more willing to become licensed and work in states that have less-stringent SOP laws (Kalish and Spurr, 2004) or more willing to work with underserved

populations, such as Medicaid and rural Medicare beneficiaries (Grumbach et al., 2003; Hing, Hooker, and Ashman, 2011). According to some measures (e.g., receipt of preventive visits or ability to see providers when care is needed), access to care could improve by 10 percent or more with NPs moving toward full practice authority. In addition, routine checkups were reported to be more frequent among adults after less-restrictive SOP laws were enacted and when health-care providers providing the checkups included NPs.

Quality and Outcomes

Two studies estimating the direct impact of SOP laws (Stange, 2014; Traczynski and Udalova, 2014) directly addressed quality or outcomes of care. Stange (2014) found no statistically significant relationships between SOP laws and delivery of evidence-based care (e.g., blood pressure screening). Traczynski and Udalova (2014) assessed the impact of SOP laws on ACS emergency admissions, self-reported health status, and subjective measures of primary care quality. They found a 14-percent reduction in ACS admissions in states with full practice authority in the first two years after relaxing SOP laws. High ACS admissions are an indicator of low-quality office-based care (Rosano et al., 2013) because accessible, adequate, and high-quality primary care should reduce these admissions. Traczynski and Udalova (2014) also found that, in states with SOP laws that allow for independent NP practice, an additional roughly 5 percent of the adult population reported being in excellent health. However, the magnitude and statistical significance of these results were inconsistent over time. Finally, Traczynski and Udalova (2014) reported that adults had better care experiences in independent SOP states; patients report that their providers are more likely to listen to them carefully and explain things clearly.

Quality and Outcomes Summary

Traczynski and Udalova (2014) found fewer ACS emergency admissions, more cases of positive self-reported health status, and better care experiences in states with less-restrictive SOP laws. Although these outcomes are compelling, they are based on only the Traczynski and Udalova study and so are inconclusive.

Costs

Several studies addressed the impact that SOP laws have on costs. In this section, we consider costs to be the product of unit prices and utilization. We discuss both prices and overall costs, while considering findings from the “Access and Utilization” section above. In terms of total costs, we focus specifically on overall health system costs. With respect to unit prices for a *specific* service, Kleiner et al. (2014) found that well-child visits were 6 percent cheaper in states without SOP restriction, while Stange (2014) found no significant effect on the price of office

visits. Despite some evidence that states without SOP restrictions have lower prices, total health-care costs are the product of the price of a given service and the number and mix of services provided. Although prices could decrease for a given service from an NP with full practice authority, the amount of services provided could increase, raising the overall cost of health care. In the Stange (2014) study, despite no effect on prices, total spending on office visits was 4.3 percent higher in states where NPs have independent prescriptive authority. That figure represents spending in all office-based settings and for physician and NP visits. As mentioned previously, the Traczynski and Udalova study found a reduction in ACS ED visits. Given the relative price differences across office visits and ED visits, the reduction in ED visits could counterbalance a small increase in office-based spending. However, Traczynski and Udalova did not provide actual cost estimates related to reduction in ED visits, so we cannot estimate the magnitude of this counterbalancing effect.

As stated previously, our literature review suggests that health-care prices drop after SOP laws are relaxed, potentially because of increases in the supply of NPs, leading to more competition. But as said previously, total spending might increase as access to care improves and utilization increases. So, the total effect on spending is unclear. Although not included in the formal literature review, the results from Spetz et al. (2013) are illustrative. That study found that total spending for a 14-day episode of care for a specific set of relatively minor illnesses that can be treated at retail clinics cost \$543 in states without NP independence, \$484 in states with independent practice authority, and \$507 in states with both independent practice and independent prescriptive authority. States granting NPs independent prescriptive authority had higher rates of prescriptions filled and higher prescription costs, as well as higher overall costs, than those with only practice independence, which is consistent with findings in the Stange (2014) study. Nevertheless, total spending in states with complete independent prescriptive authority was still slightly lower than in those with no independence, which could reflect lower prices in the independent states because of fewer restrictions on care.

Finally, SOP restrictions also impose direct costs on NPs with respect to their collaborating physicians. Though there are few comprehensive data on these payments, researchers from the Federal Trade Commission found that NPs in Louisiana paid 10 to 45 percent of practice revenues to their collaborating physicians (Gilman and Koslov, 2014). Assessing the effect that such payments can have on people's health-care spending is challenging, but the payments could lead NPs to charge more for services to offset the cost. The payments to collaborating physicians could also reduce NPs' net income and discourage them from taking on additional work, resulting in their providing less patient care. Although this is theoretically possible, we have no systematic evidence to confirm that this is occurring.

Cost Summary

The effect of SOP laws on total health-care spending is inconclusive. Prices do appear to go down slightly, while utilization increases because of improvements in access to care. Spending in

states that grant NPs full prescriptive authority does seem to increase slightly for some services, such as office visits. However, ACS-related emergency visits tend to drop. NP independence might reorient spending toward higher-value services. If, as the studies suggest, NP full practice authority leads to more office-based primary care visits and checkups and fewer ACS emergency visits, then value per dollar spent should increase; however, there is not enough evidence to know definitively. It does appear that restrictive SOP laws could, in some states, force NPs to pay a significant share of practice revenues to their collaborating physicians.

Application of Results to Certified Registered Nurse Anesthetists, Certified Nurse-Midwives, and Clinical Nurse Specialists

Although we do not have direct literature on similar impacts for other APRNs (CRNAs, CNMs, and CNSs), we consider how these results might be similar to or different from the impact for NPs by reflecting on the characteristics and modes in which the other APRNs generally practice.

Certified Registered Nurse Anesthetists

CRNAs are master's- or doctoral-prepared APRNs who have advanced training in the delivery of anesthesia. CRNAs administer anesthesia to patients undergoing surgical procedures, in addition to therapeutic nonsurgical, diagnostic, and obstetrical procedures and pain management. As such, CRNAs are employed not only in the inpatient setting (e.g., hospital) but also in emergency rooms; outpatient settings, such as ambulatory surgical centers; pain management centers; and physician offices. CRNAs are currently the second-largest group of APRNs in the state of Ohio, numbering approximately 2,796 (State of Ohio Board of Nursing, 2014). Difficulties with clinical privileging, mandated physician supervision, and the lack of prescriptive privileging are seen as barriers to APRN CRNA SOP (Fairman et al., 2011). Particularly, lack of prescribing privileges can lead to perceived delays in the delivery of postoperative pain care. Also, SOP laws could lead to costlier care arrangements because anesthesia-delivery models that require physician oversight are likely to be more expensive than CRNA-only models (Hogan et al., 2010). Furthermore, some studies have demonstrated that CRNAs are safe providers of anesthesia and that there is no difference in quality compared with physician anesthesiologists (Needleman and Minnick, 2009; Dulisse and Cromwell, 2010). Additionally, updated SOP laws might increase the number CRNAs in Ohio, improving patient access to anesthesia services. No studies on CRNAs met the inclusion criteria, so we could not collect direct estimates of the effect of SOP laws for this APRN group.

Certified Nurse-Midwives

Ohio's 364 CNMs are master's- or doctoral-prepared registered nurses with advanced training in the area of women's health care, which includes birth-related services and family

planning, as well as well-woman and menopausal care (State of Ohio Board of Nursing, 2014). CNMs practice in outpatient settings, birthing centers, and hospitals, with the majority of CNMs in Ohio employed by hospital systems. Although no studies of CNMs were included in our analyses, some studies have demonstrated that CNMs can deliver safe care with similar outcomes to those associated with obstetricians and gynecologists (Oakley et al., 1996; MacDorman and Singh, 1998; Johantgen et al., 2012). Additionally, updated SOP laws might increase the number of Ohio CNMs, improving access to women's health-care services. If an increase in CNMs contributed to more CNM-attended births, evidence suggests that this might lead to lower costs. CNM-attended births are much less likely to result in cesarean sections (Johantgen et al., 2012), which are more expensive than vaginal births (Thomson Healthcare, 2007). Furthermore, malpractice costs for obstetrics care are high, and supervisory requirements could affect malpractice costs for supervising physicians, as well as CNMs. Malpractice costs might go down if SOP regulations were relaxed. As stated previously, no studies for CNMs met our inclusion criteria, so we do not report any direct estimates of the effect of SOP laws for CNMs.

Clinical Nurse Specialists

CNSs are master's- or doctoral-prepared nurses in specialized areas of nursing practice. Numbering about 1,596 in Ohio, CNSs provide direct patient care, act as consultants to hospitals' nursing staff, and participate in quality-improvement initiatives. Increasingly, CNSs provide direct patient care that includes diagnosis, management, and prescribing. They also manage the care of complex populations and facilitate change and innovation in health-care systems (Becker et al., 2006; Lewandowski and Adame, 2009). For example, psychiatric CNSs are APRNs who provide psychotherapy and medication management, functioning similarly to NPs. One study that reported on a comparative job analysis between psychiatric NPs and CNSs found a 90-percent commonality in the two roles (Rice et al., 2007). In the state of Ohio, other than psychiatrists, psychiatric APRNs are the only providers who are licensed to both provide psychotherapy and prescribe for psychiatric patients. Many of the effects observed for NPs, particularly in psychiatric services, could potentially translate to CNSs.

Chapter Three. Ohio-Specific Impacts

Though the results in the literature are general and apply to national samples in an earlier time period, we argue that they could be used in an exploratory way to infer the effect of SOP laws for APRNs in Ohio. This can be done by using known characteristics of the population and health-care system in Ohio. We used the point estimates from the literature review studies to assess the changes in quality, access, and costs that result from moving from the most restrictive to the least restrictive SOP laws. We used Ohio-specific population estimates to determine the specific effect on Ohio. We calculated confidence intervals around each estimate to account for uncertainty in the regression estimates from the literature.²

This approach has certain obstacles and limitations. For example, obtaining state-specific information on health-care utilization can be very difficult. In the key databases used in the cited studies, particularly the Medical Expenditure Panel Survey (MEPS), state-level estimates could be obtained only using a confidential version of the data sets. Acquiring and analyzing these data sets were beyond the scope of this project. Therefore, we used national estimates for many of the utilization figures. We noted instances in which we were able to use Ohio estimates (e.g., for population totals). Specifically, our estimates are based on the assumption that the state of Ohio has 11,349,000 residents, 75 percent of whom are 18 or older (Henry J. Kaiser Family Foundation, undated). This is based on estimates from 2011 to 2012.³

We had to assume that the effects from the literature (e.g., the percentage increase in office visits resulting from a less-restrictive SOP to NPs) that were estimated nationally and prior to passage of the Patient Protection and Affordable Care Act would be a reasonable proxy for what would happen in Ohio along with likely increased access to NP care. Furthermore, some uncertainty remains about how SOP changes might affect health care in the future because the health-care environment changes rapidly. Changes in SOP laws might lead to changes in practice structures that were not conceived of when the studies in the literature were written. For example, the SOP environment could affect the orientation of practice teams in primary care (Poghosyan, Boyd, and Knutson, 2014). Greater flexibility in the way NPs and physicians collaborate could make it easier for NPs to staff after-hours care, work part-time in multiple settings, or manage their own panels of patients, if the practice would find this efficient. Finally,

² We calculated confidence intervals by using the delta method based on standard errors from regression results in the literature.

³ Note that our estimates on the potential effect of removing restrictive SOP language assume no population growth past the 2011–2012 numbers. Therefore, the estimates can be interpreted as measuring what would happen if SOP laws had already changed, as opposed to what would happen if they change in the future.

it is worth repeating that a substantial proportion of the results come from a single though robust study (Traczynski and Udalova, 2014).

Even with these many limitations, we believe that these Ohio-specific estimates provide useful information for decisionmakers in Ohio. Although the literature estimates will not be precise for Ohio today or in the future, they help to paint a picture of reasonable expectations for Ohio. Although we have pursued the best estimates we can by relying on the literature, we encourage caution in interpreting and applying them. It is important to note that, as the population of Ohio ages and more Ohioans obtain health insurance under the Affordable Care Act, the effect of the relaxation of SOP laws could be even larger in some cases (such as access to care) as more and more people have coverage and seek care.

Access and Utilization

One of the least ambiguous results of NP full practice authority in the literature is an improvement in access to care. Kleiner et al. (2014) found that enacting independent practice and prescribing for NPs led to an 11-percent increase in hours worked among NPs. There are approximately 7,565 NPs in Ohio (State of Ohio Board of Nursing, 2014); thus, an increase of 11 percent in hours worked is roughly equivalent to an effective increase in 832 NPs in the state (confidence interval of ± 98 NPs). This larger supply of NPs would likely improve access to care among patients in Ohio. Traczynski and Udalova (2014) found that the probability of a person 18 or older receiving a routine checkup would increase by 3.8 percentage points one to two years after a change in SOP laws, and 6.8 percentage points 11 years after the change in SOP. We assume that, at baseline, roughly 63 percent of Ohioans (around 5,400,000) had preventive-care visits, based on the observed national rates in Traczynski and Udalova. Table 3.1 shows the changes that would occur in Ohio given these estimates. Within one to two years of changing the SOP laws, a little over 330,000 more Ohioans could potentially receive preventive-care visits, increasing to about 600,000 by year 11. However, these estimates have significant ranges of possible values, as demonstrated in the wide confidence intervals shown in Table 3.1. This suggests that the improvement in the numbers of adults receiving a routine checkup within one to two years could range from roughly 158,557 (337,065 minus 178,508) to 515,573 (337,065 plus 178,508).

Table 3.1. Change in the Number of Adults Who Would Receive Preventive-Care Visits in Ohio After a Change in the Scope-of-Practice Laws

Measure	Number of Adults
Baseline	5,379,426
Difference 1–2 years after SOP reforms	337,065 ±178,508
Difference 10+ years after SOP reforms	578,799 ±310,304

SOURCES: Caldwell and Kirby, 2012; Henry J. Kaiser Family Foundation, undated; Traczynski and Udalova, 2014. NOTE: Numbers indicate the number of adults in Ohio who would have received a routine checkup in the past 12 months.

Furthermore, Traczynski and Udalova (2014) found 10- to 20-percent improvements on other subjective measures of access under less-restrictive SOP laws, such as whether it was easy for someone to get to a provider when needed, easy to get care when sick, and easy to travel to the provider. Given the proportion of patients in the Traczynski and Udalova (2014) study, we estimate that between 6 million and 8 million residents in Ohio would currently report having optimal access to care in these measures. Using Traczynski and Udalova’s estimates on the potential improvement in these measures after expanding SOP for NPs, we estimate that as many as an additional 1.5 million Ohio residents would potentially report better access to care. Again, the confidence intervals around these estimates are wide, as shown in Table 3.2.

Table 3.2. Change in Number of Ohio Residents Reporting on Three Measures of Access to Care

Measure	Residents Who Can		
	Get Appointment When Wanted	Get Appointment When Sick	Easily Travel to Provider
Baseline	6,071,715	7,121,498	7,688,948
Difference 1–2 years after SOP reforms	984,242 ±427,764	1,200,440 ±716,121	721,513 ±507,833
Difference 10+ years after SOP reforms	1,396,778 ±930,645	1,373,229 ±1,055,498	1,560,488 ±879,133

SOURCES: Henry J. Kaiser Family Foundation, undated; Traczynski and Udalova, 2014.

Quality and Outcomes

Impacts on quality and outcomes of care are uncertain. Traczynski and Udalova (2014) found that a higher proportion of people reported excellent health after less-restrictive SOP laws were enacted, but these results were small and inconsistent in effect. The authors also found stronger evidence of a shift from acute care to ambulatory and preventive care, as well as improvements in the patient experience. Particularly, applying the authors’ results to Ohio suggests that removing restrictive SOP laws for NPs could lead to around 70,000 fewer ACS emergency visits in Ohio (Table 3.3), and as many as 1.2 million patients could potentially report improved care experiences (Table 3.4). These findings are consistent with the fact that the majority of NPs are

employed in primary care and that the nursing model of care (which underlies NP practice) focuses on education, prevention, and wellness (Smith, 1995), which could help to keep patients out of the ED and lead to an improved care experience. Again, these estimates have wide confidence intervals.

Table 3.3. Change in Number of Ambulatory Care–Sensitive Emergency-Department Visits

Measure	ACS ED Visits
Baseline	537,670
Difference 1–2 years after SOP reforms	–75,274 ±46,369
Difference 10+ years after SOP reforms	–68,822 ±53,008

SOURCES: Johnson et al., 2012; Henry J. Kaiser Family Foundation, undated; Traczynski and Udalova, 2014.
NOTE: Estimates are based on Ohio population estimates and national estimates of ED utilization, particularly ACS visits. Estimates assume that roughly 8 percent of all ED visits are ACS visits.

Table 3.4. Change in Ohio Residents’ Reporting on Quality of Care

Measure	Residents Reporting That the Provider		
	Spent Enough Time	Listened Carefully	Explained Things Carefully
Baseline	6,156,833	7,064,753	7,603,830
Difference 1–2 years after SOP reforms	939,981 ±740,832	1,024,531 ±258,588	922,674 ±549,885
Difference 10+ years after SOP reforms	1,087,802 ±958,551	1,189,091 ±627,801	1,114,188 ±916,218

SOURCES: Henry J. Kaiser Family Foundation, undated, Traczynski and Udalova, 2014.

Costs

Studies show that, after SOP laws change, prices for certain types of visits could go down. Kleiner et al. (2014) estimated that well-child visit prices could drop by 6 percent. They also estimated that, from 2005 to 2010, the average price for a well-child visit was approximately \$96, so a 6-percent drop in price would reduce costs to an average of \$90. It is reasonable to assume that the price of similar visits could drop in Ohio as well, which would produce considerable savings for the state of Ohio and its insurers. However, the exact numbers are unknown because we have no data on the price for well-child visits in Ohio and do not know how utilization would change as a result of a reduction in price.

Stange (2014) found that total spending on office visits increased 4.3 percent in states with fully independent NP prescriptive authority. We know that the cost of physician office visits constitutes 17 percent of total health expenditure (Davis and Carper, 2012) and the total health expenditure for the state of Ohio was \$81 billion in 2009, according to the most-recent estimates by the Centers for Medicare and Medicaid Services (Henry J. Kaiser Family Foundation, undated). This means that approximately \$14 billion is spent each year on physician services in Ohio. After independent prescriptive authority, total health expenditure would likely increase by

approximately \$600 million per year (Table 3.5). However, it is important to note that Ohio already grants prescriptive authority to NPs with physician collaboration. So this effect could be smaller than it is in states that grant no such prescriptive authority. If the actual estimate for Ohio were closer to the bottom of the confidence interval, the effect would be quite small.

Table 3.5. Change in Total Health Expenditure for Office Visits After Relaxation of Scope-of-Practice Laws

Measure	Expenditure (\$)
Baseline	13,953,258,000
Difference	599,990,094 ±574,316,099

SOURCES: Davis and Carper, 2012; Henry J. Kaiser Family Foundation, undated; Stange, 2014.

The isolated estimates from Kleiner et al. (2014) and Stange (2014) cannot be used to determine an overall effect of NP independence on total health-care spending, given the mixed results and the many gaps. It is likely that inpatient or ED spending would be reduced as a result of better access to care. As noted above, Traczynski and Udalova (2014) found reduced ACS ED visits in states with full practice authority for NPs. Reduction in the direct costs of physician supervision and regulated relationships with physicians could enhance the earnings of NPs or could, to some extent, be passed on to consumers as lower prices of care.

Chapter Four. Conclusion

APRNs make up the fastest-growing segment of the primary care professional workforce in the United States (Gilman and Koslov, 2014) and are more likely to practice in underserved areas, lower-income areas, and districts with lower scores on the High School Proficiency Assessment (Gilman and Koslov, 2014). States are considering expanding SOP for these APRNs as a potential approach to improve access to care, maintain or enhance care quality, and decrease overall health-care costs. Previous studies have demonstrated that APRNs deliver care that is of equal quality to the care provided by their physician counterparts. Our own review of the literature demonstrates that granting APRNs full practice authority would likely increase access to health-care services for Ohioans with possible increases in quality and no clear increase in costs.

Appendix: Literature Review Methods and Detailed Findings

We performed a literature assessment by searching the PubMed and CINAHL databases using these search terms: *nurse practitioner, nurse practitioners, midwife, midwifery, nurse anesthetist, nurse anesthetists, legislation and jurisprudence, law, laws, legal, state government, scope of practice, certified nurse specialist, and certified nurse specialists*. We also used the Google search engine to find gray literature related to nursing and state SOP laws, and we reviewed nurse associations' websites (e.g., the American Nurses Association, State of Ohio Board of Nursing, American Association of Nurse Anesthetists) for other documents pertaining to Ohio's SOP laws.

Studies deemed in scope initially were rigorously reviewed for their research designs, provider definitions, data sources, peer-review status, mechanisms of effect, and plausibility of findings. After the review, we decided to focus only on quantitative studies that assessed longitudinal changes in SOP laws within a state, rather than studies that performed cross-sectional comparisons across states with varying levels of APRN independence. Cross-sectional studies are susceptible to overestimating the effect of SOP laws by not accounting for other important and unobservable differences across states that could be associated with the key outcomes of interest. Specifically, we eliminated three studies that likely overestimated the impacts of SOP laws because they did not take into account other characteristics of the states under comparison (Kuo et al., 2013; Reagan and Salsberry, 2013; Oliver et al., 2014). For two other studies (Spetz et al., 2013; Richards and Polsky, 2014), we had a high degree of confidence in their estimates, but they did not generate their estimates from longitudinal changes in SOP laws, so we did not include them in the formal review. We did, however, cite them in the result section as important illustrations. One study on which we relied for important contextual information but did not include in the formal analysis because it was qualitative in nature was Yee et al. (2013). We also eliminated some studies that were thought pieces and did not involve original data collection or analysis.

We determined early on that studies comparing APRN-provided care and physician-provided care were tangential to our objective. A relatively large body of literature assessed the impact of care provided by NPs and by primary care physicians (Laurant et al., 2005; Tolbert, 2013; Martínez-González et al., 2014). A smaller number of studies compared care provided by APRNs with care provided by physicians who have overlapping competencies and roles (Dulisse and Cromwell, 2010). However, these studies do not directly assess the effect of SOP laws, so the implications for changes in SOP must be made by inference. Furthermore, these studies have found no great differences in quality and outcomes, so these studies likely do not have direct implications for the effect of SOP laws on service delivery.

Finally, after reviewing the literature, we concluded that no objective studies assess the SOP impact for CNMs, CRNAs, or CNSs. As a result, the bulk of this analysis focused on NPs, who represent the majority of APRNs nationally. NPs constitute roughly 60 percent of all APRNs employed in nursing in the United States (Health Resources and Services Administration, 2010). We discussed extrapolating our findings to other APRNs at the end of the main body of this report.

Table A.1 summarizes the key studies in our assessment. The summary includes the authors, when the study was conducted, the main outcome, and additional notes or comments.

Table A.1. Summary of Primary Studies Included in the Literature Assessment

Study	Data and Study Design	Key Findings	Notes and Comments
Stange, 2014	Retrospective study combining SOP laws, provider data, and individual data from the 1996–2008 MEPS	Letting NPs prescribe drugs leads to 2% more office visits. It leads to 3.5% higher visit charges from the provider (but not higher paid amounts per visit from the insurer) and 4.3% more spending on office visits. A larger NP supply is more likely to lead to increased utilization in states with liberal SOP than in states with restrictive SOP laws.	Assessing the direct impact of SOP was a secondary aim of the paper. Among those results, the estimates at the state level without controlling for supply are more aligned with the question in this study.
Kleiner et al., 2014	Retrospective analysis of SOP laws in combination with labor-market data from the U.S. Census Bureau	Full prescriptive authority for NPs leads to 14% higher NP hourly earnings and 11% more hours worked annually. It also leads to 7% lower physician hourly earnings and 6% fewer physician hours worked. There was a 6% decrease in the prices paid for well-child visits.	This working paper is not yet published in a peer-reviewed journal. The authors also have an imprecise definition of NPs (registered nurse with master's degree) as necessitated by their data source.
Traczynski and Udalova, 2014	Retrospective analysis of SOP laws in combination with data from the 1995–2012 MEPS	With full independent practice and prescriptive authority, subjective access-to-care measures (ease of getting checkups, providers taking time with and listening to patients, travel time to appointments) improve by roughly 10%–20%. The percentage of the population with routine checkups in the past year would be 3.1 points higher in the 2 years after NP independence and 7.4 points higher 11 years after. They also find a 22% reduction in ED visits for non-ACS conditions in independent states. They do not find a differential effect in rural versus urban areas.	This paper is not yet published in a peer-reviewed journal. The effects are large (as are findings for physicians), but little mechanistic detail is available indicating the cause of these effects.

References

AAFP—*See* American Academy of Family Physicians.

AMA—*See* American Medical Association.

American Academy of Family Physicians, “Nurse Practitioners,” undated; referenced August 27, 2014. As of December 30, 2014:

<http://www.aafp.org/about/policies/all/nurse-practitioners.html>

———, *Primary Care for the 21st Century: Ensuring a Quality, Physician-Led Team for Every Patient*, September 18, 2012. As of December 30, 2014:

http://www.aafp.org/dam/AAFP/documents/about_us/initiatives/AAFP-PCMHWhitePaper.pdf

———, “National Resident Matching Program Data,” 2014. As of December 30, 2014:

<http://www.aafp.org/medical-school-residency/residency/match/nrmp.html>

American Medical Association, “AMA Responds to IOM Report on Future of Nursing,” press release, October 5, 2010. As of December 30, 2014:

<http://www.ama-assn.org/ama/pub/news/news/nursing-future-workforce.page>

Auerbach, D. I., “Will the NP Workforce Grow in the Future? New Forecasts and Implications for Healthcare Delivery,” *Medical Care*, Vol. 50, No. 7, July 2012, pp. 606–610.

Becker, Deborah, Roberta Kaplow, Patricia M. Muenzen, and Carol Hartigan, “Activities Performed by Acute and Critical Care Advanced Practice Nurses: American Association of Critical-Care Nurses Study of Practice,” *American Journal of Critical Care*, Vol. 15, No. 2, March 2006, pp. 130–148.

Caldwell, Julia, and Jim Kirby, “Preventive Health Care Utilization by Adult Residents of MSAs and Non-MSAs: Differences by Race/Ethnicity, 2009,” Rockville, Md.: Agency for Healthcare Research and Quality, Statistical Brief 383, August 31, 2012. As of December 30, 2014:

http://meps.ahrq.gov/data_stats/Pub_ProdResults_Details.jsp?pt=Statistical+Brief&opt=1&id=1074

Davis, Karen E., and Kelly Carper, “Use and Expenses for Office-Based Physician Visits by Specialty, 2009: Estimates for the U.S. Civilian Noninstitutionalized Population,” Rockville, Md.: Agency for Healthcare Research and Quality, Statistical Brief 381, August 29, 2012. As of December 30, 2014:

http://meps.ahrq.gov/data_stats/Pub_ProdResults_Details.jsp?pt=Statistical+Brief&opt=1&id=1072

- Dears, Elizabeth, senior vice president and chief legislative counsel, Medical Society of the State of New York, “Testimony of the Medical Society of the State of New York Before the New York State Assembly Committee on Ways and Means and Senate Finance Committee on the Governor’s Proposed Public Health Budget for State Fiscal Year 2014–2015,” c. 2014. As of January 12, 2015:
<http://www.nysenate.gov/files/pdfs/Medical%20Society%20of%20the%20State%20of%20N%20Y.pdf>
- Dower, C., J. Moore, and M. Langelier, “It Is Time to Restructure Health Professions Scope-of-Practice Regulations to Remove Barriers to Care,” *Health Affairs*, Vol. 32, No. 11, November 2013, pp. 1971–1976.
- Dulisse, Brian, and Jerry Cromwell, “No Harm Found When Nurse Anesthetists Work Without Supervision by Physicians,” *Health Affairs*, Vol. 29, No. 8, August 2010, pp. 1469–1475.
- Fairman, Julie A., John W. Rowe, Susan Hassmiller, and Donna E. Shalala, “Broadening the Scope of Nursing Practice,” *New England Journal of Medicine*, Vol. 364, No. 3, January 20, 2011, pp. 193–196.
- Gilman, Daniel J., and Tara Isa Koslov, *Policy Perspectives: Competition and the Regulation of Advanced Practice Nurses*, Washington, D.C.: Federal Trade Commission, March 2014. As of December 30, 2014:
<http://www.ftc.gov/reports/policy-perspectives-competition-regulation-advanced-practice-nurses>
- Grumbach, Kevin, L. Gary Hart, Elizabeth Mertz, Janet Coffman, and Lorella Palazzo, “Who Is Caring for the Underserved? A Comparison of Primary Care Physicians and Nonphysician Clinicians in California and Washington,” *Annals of Family Medicine*, Vol. 1, No. 2, July 2003, pp. 97–104.
- Health Resources and Services Administration, *The Registered Nurse Population: Findings from the 2008 National Sample Survey of Registered Nurses*, Washington, D.C.: U.S. Department of Health and Human Services, 2010. As of December 30, 2014:
<http://bhpr.hrsa.gov/healthworkforce/rnsurveys/rnsurveyfinal.pdf>
- Henry J. Kaiser Family Foundation, “State Health Facts,” undated; referenced September 1, 2014. As of December 30, 2014:
<http://kff.org/statedata/>
- Hing, Esther, Roderick S. Hooker, and Jill J. Ashman, “Primary Health Care in Community Health Centers and Comparison with Office-Based Practice,” *Journal of Community Health*, Vol. 36, No. 3, June 2011, pp. 406–413.

- Hogan, Paul F., Rita Furst Seifert, Carol S. Moore, and Brian E. Simonson, “Cost Effectiveness Analysis of Anesthesia Providers,” *Nursing Economics*, Vol. 28, No. 3, May–June 2010, pp. 150–169.
- Iglehart, John K., “Expanding the Role of Advanced Nurse Practitioners: Risks and Rewards,” *New England Journal of Medicine*, Vol. 368, No. 20, May 16, 2013, pp. 1935–1941.
- Institute of Medicine, *The Future of Nursing: Leading Change, Advancing Health*, Washington, D.C.: National Academies Press, October 5, 2010. As of December 30, 2014: <http://www.iom.edu/Reports/2010/The-Future-of-Nursing-Leading-Change-Advancing-Health.aspx>
- Jauhar, Sandeep, “Nurses Are Not Doctors,” *New York Times*, April 29, 2014. As of January 12, 2015: <http://www.nytimes.com/2014/04/30/opinion/nurses-are-not-doctors.html>
- Johantgen, Meg, Lily Fountain, George Zangaro, Robin Newhouse, Julie Stanik-Hutt, and Kathleen White, “Comparison of Labor and Delivery Care Provided by Certified Nurse-Midwives and Physicians: A Systematic Review, 1990 to 2008,” *Women’s Health Issues*, Vol. 22, No. 1, January–February 2012, pp. e73–e81.
- Johnson, Pamela Jo, Neha Ghildayal, Andrew C. Ward, Bjorn C. Westgard, Lori L. Boland, and Jon S. Hokanson, “Disparities in Potentially Avoidable Emergency Department (ED) Care: ED Visits for Ambulatory Care Sensitive Conditions,” *Medical Care*, Vol. 50, No. 12, December 2012, pp. 1020–1028.
- Kalist, D. E., and S. J. Spurr, “The Effect of State Laws on the Supply of Advanced Practice Nurses,” *International Journal of Health Care Finance and Economics*, Vol. 4, No. 4, December 2004, pp. 271–281.
- Kleiner, Morris M., Allison Marier, Kyoung Won Park, and Coady Wing, *Relaxing Occupational Licensing Requirements: Analyzing Wages and Prices for a Medical Service*, Cambridge, Mass.: National Bureau of Economic Research, Working Paper 19906, February 2014. As of December 30, 2014: <http://www.nber.org/papers/w19906>
- Kuo, Yong-Fang, Figaro L. Loresto, Jr., Linda R. Rounds, and James S. Goodwin, “States with the Least Restrictive Regulations Experienced the Largest Increase in Patients Seen by Nurse Practitioners,” *Health Affairs*, Vol. 32, No. 7, July 2013, pp. 1236–1243.
- Laurant, M., D. Reeves, R. Hermens, J. Braspenning, R. Grol, and B. Sibbald, “Substitution of Doctors by Nurses in Primary Care,” *Cochrane Database System Review*, No. 2, April 18, 2005.

- Lewandowski, W., and K. Adamle, "Substantive Areas of Clinical Nurse Specialist Practice: A Comprehensive Review of the Literature," *Clinical Nurse Specialist*, Vol. 23, No. 2, March–April 2009, pp. 73–90.
- Lugo, Nancy Rudner, Eileen T. O’Grady, Donna R. Hodnicki, and Charlene M. Hanson, "Ranking State NP Regulation: Practice Environment and Consumer Healthcare Choice," *American Journal for Nurse Practitioners*, Vol. 11, No. 4, April 2007, pp. 8–24.
- MacDorman, M. F., and G. K. Singh, "Midwifery Care, Social and Medical Risk Factors, and Birth Outcomes in the USA," *Journal of Epidemiology and Community Health*, Vol. 52, No. 5, May 1998, pp. 310–317.
- Martínez-González, Nahara Anani, Sima Djalali, Ryan Tandjung, Flore Huber-Geismann, Stefan Markun, Michel Wensing, and Thomas Rosemann, "Substitution of Physicians by Nurses in Primary Care: A Systematic Review and Meta-Analysis," *BMC Health Services Research*, Vol. 14, 2014, p. 214.
- Merritt Hawkins, "Over 90% of New Physician Jobs Feature Employment by Hospitals or Other Facilities," press release, June 30, 2014. As of December 30, 2014:
http://www.merrithawkins.com/uploadedFiles/MerrittHawkings/Clients/Merritt_Hawkins_2014_Physician_Recruiting_Incentive_Review.pdf
- National Committee for Quality Assurance, "Recognizing Nurse Practitioners and Physician Assistants for Excellence in Care," undated; referenced November 14, 2014. As of December 30, 2014:
<http://www.ncqa.org/portals/0/programs/Recognition/nursepractitioners06162010.pdf>
- National Governors Association, *The Role of Nurse Practitioners in Meeting Increasing Demand for Primary Care*, Washington, D.C.: Health Division, December 2012. As of December 30, 2014:
<http://www.nga.org/cms/home/nga-center-for-best-practices/center-publications/page-health-publications/col2-content/main-content-list/the-role-of-nurse-practitioners.html>
- National Quality Measures Clearinghouse, "Ambulatory Care Sensitive Conditions: Age-Standardized Acute Care Hospitalization Rate for Conditions Where Appropriate Ambulatory Care Prevents or Reduces the Need for Admission to the Hospital per 100,000 Population Younger Than Age 75 Years," reaffirmed July 11, 2014. As of January 1, 2015:
<http://www.qualitymeasures.ahrq.gov/content.aspx?id=47604>
- Needleman, Jack, and Ann F. Minnick, "Anesthesia Provider Model, Hospital Resources, and Maternal Outcomes," *Health Services Research*, Vol. 44, No. 2, Part 1, April 2009, pp. 464–482.

- Newhouse, Robin P., Julie Stanik-Hutt, Kathleen M. White, Meg Johantgen, Eric B. Bass, George Zangaro, Renee F. Wilson, Lily Fountain, Donald M. Steinwachs, Lou Heindel, and Jonathan P. Weiner, "Advanced Practice Nurse Outcomes 1990–2008: A Systematic Review," *Nursing Economics*, Vol. 29, No. 5, September–October 2011, pp. 1–21.
- Oakley, Deborah, Mary Ellen Murray, Terri Murtland, Robert Hayashi, H. Frank Andersen, Fran Mayes, and Judith Rooks, "Comparisons of Outcomes of Maternity Care by Obstetricians and Certified Nurse-Midwives," *Obstetrics and Gynecology*, Vol. 88, No. 5, November 1996, pp. 823–829.
- Oliver, Gina M., Lila Pennington, Sara Revelle, and Marilyn Rantz, "Impact of Nurse Practitioners on Health Outcomes of Medicare and Medicaid Patients," *Nursing Outlook*, Vol. 62, No. 6, November–December 2014, pp. 440–447.
- Pearson, Linda J., "The Pearson Report," *American Journal for Nurse Practitioners*, Vol. 13, No. 2, February 2009.
- Perryman Group, *The Economic Benefits of More Fully Utilizing Advanced Practice Registered Nurses in the Provision of Health Care in Texas: An Analysis of Local and Statewide Effects on Business Activity*, Waco, Texas, May 2012.
- Petterson, Stephen M., Winston R. Liaw, Robert L. Phillips, Jr., David L. Rabin, David S. Meyers, and Andrew W. Bazemore, "Projecting US Primary Care Physician Workforce Needs: 2010–2025," *Annals of Family Medicine*, Vol. 10, No. 6, November–December 2012, pp. 503–509.
- Poghosyan, Lusine, Donald Boyd, and Ashley R. Knutson, "Nurse Practitioner Role, Independent Practice, and Teamwork in Primary Care," *Journal for Nurse Practitioners*, Vol. 10, No. 7, July–August 2014, pp. 472–479.
- Public Law 111-148, Patient Protection and Affordable Care Act, March 23, 2010. As of December 31, 2014:
<http://www.gpo.gov/fdsys/granule/PLAW-111publ148/PLAW-111publ148/content-detail.html>
- Reagan, Patricia B., and Pamela J. Salsberry, "The Effects of State-Level Scope-of-Practice Regulations on the Number and Growth of Nurse Practitioners," *Nursing Outlook*, Vol. 61, No. 6, November–December 2013, pp. 392–399.
- Rice, Michael J., Mary D. Moller, Christina DePascale, and Lee Skinner, "APNA and ANCC Collaboration: Achieving Consensus on Future Credentialing for Advanced Practice Psychiatric and Mental Health Nursing," *Journal of the American Psychiatric Nurses Association*, Vol. 13, No. 3, June–July 2007, pp. 153–159.

- Richards, Michael R., and Daniel Polsky, “Provider Mix, Regulatory Hurdles, and New Patient Primary Care Visits,” paper presented at the fifth biennial conference of the American Society of Health Economists, Los Angeles, June 22–25, 2014.
- Rosano, Aldo, Christian Abo Loha, Roberto Falvo, Jouke van der Zee, Walter Ricciardi, Gabriella Guasticchi, and Antonio Giulio de Belvis, “The Relationship Between Avoidable Hospitalization and Accessibility to Primary Care: A Systematic Review,” *European Journal of Public Health*, Vol. 23, No. 3, June 1, 2013, pp. 356–360.
- Smith, Marlaine C., “The Core of Advanced Practice Nursing,” *Nursing Science Quarterly*, Vol. 8, No. 1, Spring 1995, pp. 2–3.
- Spetz, Joanne, Stephen T. Parente, Robert J. Town, and Dawn Bazarko, “Scope-of-Practice Laws for Nurse Practitioners Limit Cost Savings That Can Be Achieved in Retail Clinics,” *Health Affairs*, Vol. 32, No. 11, November 2013, pp. 1977–1984.
- Stange, Kevin, “How Does Provider Supply and Regulation Influence Health Care Markets? Evidence from Nurse Practitioners and Physician Assistants,” *Journal of Health Economics*, Vol. 33, January 2014, pp. 1–27.
- State of Ohio Board of Nursing, *Annual Report: July 1, 2013–June 30, 2014*, September 29, 2014. As of December 30, 2014:
http://www.nursing.ohio.gov/PDFS/AnnualReport/FY14_Annual_Report_Final.pdf
- Thomson Healthcare, *The Healthcare Costs of Having a Baby*, March of Dimes, June 2007.
- Tolbert, Erin, “The Future for Nurse Practitioner Scope of Practice Laws Looks Merry and Bright This Season,” *Barton Blog*, December 9, 2013. As of December 30, 2014:
<http://www.bartonassociates.com/2013/12/09/the-future-for-nurse-practitioner-scope-of-practice-laws-looks-merry-and-bright-this-season/>
- Traczynski, Jeffrey, and Victoria Udalova, *Nurse Practitioner Independence, Health Care Utilization, and Health Outcomes*, paper presented at the fifth biennial conference of the American Society of Health Economists, Los Angeles, June 22–25, 2014.
- Weinberg, Micah, and Patrick Kallerman, *Full Practice Authority for Nurse Practitioners Increases Access and Controls*, San Francisco, Calif.: Bay Area Council Economic Institute, Spotlight Brief, April 2014.
- Yee, Tracy, Ellyn R. Boukus, Dori Cross, and Divya R. Samuel, “Primary Care Workforce Shortages: Nurse Practitioner Scope-of-Practice Laws and Payment Policies,” National Institute for Health Care Reform Research Brief 13, February 2013. As of December 30, 2014:
<http://www.nihcr.org/PCP-Workforce-NPs>