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Cost-Effectiveness of Nurse Practitioners

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Abstract

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Keywords

nurse practitioners, cost-effectiveness, substitution, task shifting

Disciplines

Business

Cost-Effectiveness of Nurse Practitioners

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Abstract

The Patient Protection and Affordable Care Act is motivated by the imperative to reduce the continuous growth in healthcare spending, as the rapid rise in healthcare spending has become a threat to the economic future of the United States. Nurse practitioners have the potential to lower costs by assuming provider roles within the healthcare workforce to deliver care of equal or better quality at lower costs than comparable services by other providers. The published literature was reviewed to assess the cost-effectiveness of care provided by nurse practitioners as compared to physicians in a wide variety of primary and acute care clinical settings. Cost-effectiveness analysis from payer, societal, and hospital and employer stakeholder perspectives supports the substitution of nurse practitioners for physicians in their overlapping scopes of practice, as nurse practitioners provide cost-effective care in primary and acute care settings.

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INTRODUCTION

Although the literature suggests that nurse practitioners increase access to healthcare services and provide equal or superior quality of care as compared to physicians, there is little synthesis on the cost-effectiveness of nurse practitioners. As a foundation for meaningful health reform, cost-effectiveness analysis provides estimates of the magnitudes of costs and health outcomes. In this context, the cost-effective outcome is the least expensive labor input to produce healthcare services with the desired clinical result (Bauer 2010). By evaluating outcomes and costs of interventions designed to improve health, cost-effectiveness analysis serves as a guide to resource allocation. Cost-effectiveness analysis illuminates the opportunity cost of each choice, providing decision makers with the necessary information to make informed judgments (Weinstein et al. 1996). Currently, there is no clear consensus on the cost-effectiveness of nurse practitioners, as there has not been a rigorous synthesis of available data. The synthesis of existing information on nurse practitioner cost-effectiveness is necessary to inform healthcare policy and nurse practitioner scope of practice regulations, as well as public, organizational, and educational policy.

Quality is the most important consideration in healthcare delivery. Nurse practitioners have been demonstrated to provide equal or superior quality of care as compared to physicians, especially in the areas of wellness and prevention services, diagnosis and management of common uncomplicated acute illnesses, and management of chronic diseases (Mundinger et al. 2000; Naylor and Kurtzman 2010; Newhouse et al. 2011; Stanik-Hutt et al. 2013). Clinical outcomes do not differ for patients who receive care from nurse practitioners. In fact, the evidence supports higher levels of patient satisfaction for nurse practitioners as compared to physicians (Jennings et al. 2015; Laurant et al. 2008; Lenz et al. 2004; Mundinger et al. 2000). Significantly, no studies have found that nurse practitioners provide inferior quality of care as

compared to their physician counterparts. The literature unanimously supports that quality of care is maintained, if not improved, with the use of nurse practitioners. Since cost-effectiveness follows quality care, quality care in itself becomes cost-effective. Furthermore, nurse practitioners increase access to healthcare services for the influx of patients following implementation of the Affordable Care Act, especially in areas with underserved patient populations and physician shortages (Iglehart 2013).

Input substitution provides valuable insights to achieve the cost-effectiveness goals of healthcare reform. Removing barriers to input substitution reduces healthcare costs without compromising quality. Nurse practitioners may function in complementary or alternative provider roles. Nurse practitioners working in complementary roles are intended to extend existing services with the intention of improving the quality of care delivered (Donald 2014). However, nurse practitioners functioning in alternative provider roles substitute the services of other providers such as physicians (David 2014). The alternative provider role addresses workforce shortages while maintaining or improving the quality of care delivered (David 2014). The substitution of nurse practitioners for more costly providers reduces the costs of producing care without diminishing quality.

To answer the question of whether and/or under what circumstances nurse practitioners are more cost-effective than their physician counterparts, this study will evaluate the cost-effectiveness of care provided by nurse practitioners working in primary and acute care settings. Key stakeholders of this issue include patients, nurse practitioners, physicians, hospital administration, ambulatory care clinics, hospital and healthcare systems, nursing schools, and healthcare insurance companies. The study will focus primarily on objective measures of health system and resource utilization from the payer perspective, such as hospital readmission rates and prescriptive patterns. Using criteria such as training and compensation, the cost-effectiveness

of nurse practitioners will also be analyzed from societal as well as hospital and employer perspectives to assess the potential economic impact associated with increased use of nurse practitioners. The systematic literature review will evaluate, synthesize, and analyze a wide range of original research of previous studies involving assessment of the cost-effectiveness of nurse practitioners as compared to physicians. A mixed methods approach will build upon the systematic literature review with qualitative methods involving semi-structured interviews with nurse practitioner stakeholders in Phoenix, Arizona and San Diego, California. Nurse practitioners practicing in California are required to collaborate with physicians and develop joint protocols that cover all elements of practice, including diagnosis, patient referrals, and prescriptions. Arizona is one of 21 states that provides nurse practitioners with autonomous practice authority without physician oversight, serving as a case study of the future state of nurse practitioner cost-effectiveness. With analysis of qualitative data anchored by a literature review of current findings, the study will identify gaps in current knowledge and discuss future clinical practice, research, and policy implications.

METHOD

Literature Review

Search Strategy and Data Sources

Electronic database searches included PubMed® Plus and CINAHL® Nursing (Cumulative Index to Nursing and Allied Health Literature). To find studies that explored factors relating to nurse practitioner cost-effectiveness, key search terms used included nurse practitioner cost-effectiveness* and clinical effectiveness*. The following inclusion criteria were used:

- Randomized controlled trial (RCT) or observational study.
- Information regarding sample size provided.

- Reported quantitative data on direct costs.
- Conducted in the United States and written in English.

Participants included patients of any age receiving care in all settings and locations. Since the United States healthcare system and the education of nurse practitioners differ greatly from other countries, only studies conducted in the United States were included. Studies were excluded if they were not written in English or if they did not include quantitative data. This search strategy was modeled upon previous systematic reviews conducted on nurse practitioner quality outcomes.

Search Outcome

A multi-step process was utilized to conduct a comprehensive literature search. Starting with the titles and abstracts of 55 studies, 17 studies were found to specifically measure nurse practitioner cost-effectiveness in primary and acute care settings. Ten of these studies met the remaining inclusion criteria. These studies were retrieved for final screening. After undergoing a rigorous quality review, all studies were retained for the literature review.

Quality Review

After final screening, the quality of each study was assessed using a modified Jadad scale (Jadad et al. 1996). Please refer to Table 1 for quality assessment criteria. Since the Jadad scale was designed for randomized controlled trials, additional quality criteria were included to assess the quality of observational studies in this review. These additional quality criteria include sample size, comparability of settings and participants, reliable and validity of measures, bias control, and attribution of outcome to nurse practitioners. Participants were evaluated in separate nurse practitioner and physician groups. A score greater or equal to five is considered high quality, and a score less than or equal to four is considered low quality.

Table 1: Quality Assessment Criteria

Criteria	Rating Scale
Were patients in both groups (i.e., nurse practitioners and physicians) similar?	No (0) Yes (1)
Was setting of both groups similar?	No (0) Yes (1)
Was sample size in both groups adequate?	Less than 30 per group (0) 31-60 per group (1) Greater than 60 per group (2)
Were measures reliable and valid?	No (0) Yes (1)
Was bias controlled?	No (0) Yes (1)
Can the outcome be attributed to the nurse practitioner?	No (0) Partial (1) Yes (2)
Potential Range	0-8 ≥ 5: High Quality ≤ 4: Low Quality

Interviews

Sample

Phoenix was selected as a sample because Arizona is a progressive state in regards to scope of practice regulations for nurse practitioners. Under the Arizona Nurse Practice Act, nurse practitioners in Arizona have full practice authority with no physician oversight. San Diego was selected as a sample because California's restrictive nurse practitioner scope of practice regulations are reflective of the current regulatory environment in 29 states. California Senate Bill 323, which would have provided California nurse practitioners to practice to the full extent of their education and expertise, was defeated by the Assembly Committee on Business and Professions on June 30, 2015 after passing unanimously through the State Senate (CANP 2015).

Nurse practitioners in California must continue to practice under collaborative written agreements with physicians. Thus, the issues that nurse practitioners face in Arizona may serve as a case study of future challenges for the profession, if and/or when more states adopt full practice authority for nurse practitioners. Arizona participants were recruited with assistance from the Coalition of Arizona Nurses in Advanced Practice and the College of Nursing and Health Innovation at Arizona State University. California participants were recruited with assistance from the California Association for Nurse Practitioners.

Data Collection and Analysis

All participants were informed about the purpose of the study and the voluntary nature of their participation. The interview guide was developed from a literature review of previous studies involving clinician cost-effectiveness and performance improvement. Interview questions were provided to participants prior to the start of the interview for context. Interviews were conducted at the convenience of the participant.

The unit of analysis is individual themes relevant to the research question. Descriptive and topic categories in the data were identified using the directed content analysis method (Hsieh and Shannon 2005). Coding categories were identified from the transcription of interviews by the investigator. Key words were analyzed and quantified into categories within the context of social and political factors surrounding the interview. Relationships between categories were identified to understand patterns in the data.

RESULTS

Thematic analysis was used to synthesize qualitative and quantitative evidence. The following information was abstracted from each article: the disease or condition, patient population, setting, quality metrics, cost metrics, and study quality (high or low). An inductive approach was used to identify and determine key themes, patterns, and concepts.

Table 2: Summary of Study Characteristics

Author(s)/ Journal	Disease/ Condition	Patient Population	Setting	Quality Metrics	Cost Metrics	Study Quality
Bissinger, R. L., Alford, C. A., Arford, P. H., and Bellig, L. L. 1997. A Cost-Effectiveness Analysis of Neonatal Nurse Practitioners. *Nursing Economics 15* (2): 92-99.	Varied	Critically ill neonates admitted to the NICU within the first 24 hours of life between January 1, 1991 and July 31, 1992, whose birth weights were between 500-1250 grams	Acute	Days on ventilator, days on oxygen, mortality, morbidity	Cost of care per infant, length of stay	High
Borgmeyer, A., Gyr, P.M., Jamerson, P.A., and Henry, L.D. 2008. Evaluation of the role of the pediatric nurse practitioner in an inpatient asthma program. *Journal of Pediatric Health Care 22* (5): 273-281.	Asthma	Children admitted to general medical/ surgical units with asthma exacerbation	Acute	Morbidity, severity of condition of the asthma patients	Costs of inpatient asthma program, length of stay, readmission rate	High
Counsell, S.R., Callahan, C.M., Clark,	Varied	Patients >64 years old with income <200% of	Primary	Assessing Care of Vulnerable Elders	Geriatric Resources for Assessment and Care of	High

D.O., Tu, W., Buttar, A.B., Stump, T.E., and Ricketts, G.D. 2007. Geriatric care management for low-income seniors: A randomized controlled trial. *Journal of the American Medical Association 298* (22): 2623-2633.		federal poverty level		(ACOVE) quality indicators	Elders (GRACE) program costs, Emergency Department visits, hospital admissions	
Feldman, P.H., McDonald, M. V., Trachtenberg, M. A., Schoenthaler, A., Coyne, N., and Teresi, J. 2015. Center for stroke disparities solutions community-based care transition interventions: Study protocol of a randomized controlled trial. *Trials 16* (1): 32.	Uncontrolled Hypertension, Stroke	Black and Hispanic post-stroke home care patients > 21 years old	Primary	Self-reported Barthel Index and EuroQol to monitor patient function and health-related quality of life, Systolic blood pressure	Costs of interventions, home care utilization, hospital and emergency visits, outpatient visits, medication regimes	High
Hemani, A., Rastegar, D. A., Hill, C.,	Varied	New primary care patients seen	Primary	Morbidity	Healthcare resource utilization	High

and Al-Ibrahim, M. S. 1998. A comparison of resource utilization in nurse practitioners and physicians. *Effective Clinical Practice 2* (6): 258-265.		at Veterans Affairs primary care clinic			(laboratory and radiologic testing, specialty care referrals, emergency visits, hospital-izations)	
Lenz, E.R., Mundinger, M.O., Kane, R.L., Hopkins, S.C., and Lin, S.X. 2004. Primary care outcomes in patients treated by nurse practitioners or physicians: Two-year follow-up. *Medical Care Research and Review 61* (3): 332-351.	Varied	Hispanic adults enrolled in Medicaid with recent ED visit	Primary	Self-reported health status, disease-specific physiologic measures, satisfaction	Use of specialist, emergency room, or inpatient services	High
Liu, N., and D'Aunno, T. 2012. The productivity and cost-efficiency of models for involving nurse practitioners in primary	Varied	Primary care adult patients	Primary	Maximum number of patients that can be accounted for practice model given timeliness-to-care requirement	Annual cost per patient in practice model	High

care: A perspective from queuing analysis. *Health Services Research 47* (2): 594-613.						
Mundinger, M. O., Kane, R. L., Lenz, E. R., Totten, A. M., Tsai, W. Y., Cleary, P. D., and Shelanski, M. L. 2000. Primary care outcomes in patients treated by nurse practitioners or physicians: A randomized trial. *Journal of the American Medical Association 283* (1): 59-68.	Varied	Adult patients previously diagnosed with asthma, diabetes, and/or hypertension with no primary care provider at time of recruitment	Primary	Patient satisfaction after initial appointment (based on 15-item questionnaire), health status (Medical Outcomes Study Short-Form), satisfaction, physiologic test results 6 months later	Service utilization 1 year after initial appointment (obtained from computer records)	High
Paul, S. 2000. Impact of a nurse-managed heart failure clinic: A pilot study. *American Journal of Critical Care 9* (2): 140-146.	Heart Failure	Adults with Chronic Heart Failure (CHF) seen in specialty clinic	Primary	Morbidity	Hospital readmissions, emergency department visits, length of stay, inpatient hospital charges	High

Spisso J., O'Callaghan C., McKennan M., and Holcroft J. 1990. Improved quality of care and reduction of housestaff workload using trauma nurse practitioners. *The Journal of Trauma 30* (6): 660-665.	Varied	Trauma and critically ill patients	Acute	Patient satisfaction, outpatient clinic waiting times, time saved for surgical housestaff, medical record documentation of care	Length of stay	High

Payer Perspective

In the context of comparing the cost-effectiveness of nurse practitioners and physicians, the main payer perspective is that of insurance companies. Of principal interest to insurance companies is the reimbursement of provider services, which is influenced by quality outcomes. Bauer (2010) found that nurse practitioners may be substituted for physicians with equal or improved outcomes in a significant percentage of medical services, ranging from 25% in specialty care to 90% in primary care. Furthermore, the cost-effectiveness of nurse practitioners in a variety of primary and acute care settings has been documented extensively in the literature.

Primary Care

Nurse practitioners provide cost-effective primary care services by placing greater emphasis on long-term risk prevention, chronic care management, and reintegration into the community. In the primary care setting, the cost-effectiveness of nurse practitioners was found to be equal to that of physicians in the care of post-acute stroke patients (Feldman et al. 2013). Nurse practitioner-led interventions emphasized chronic disease self-management and risk factor

reduction, which improved patient function and reduced costly interventions (Feldman et al. 2013). Shaw et al. (2013) found further evidence supporting the economic value of nurse practitioners in managing chronic care patients, as significant cost savings have been documented in retail clinics where nurse practitioners provide the majority of care. Nurse practitioners have been demonstrated to be highly effective in providing patient education about chronic disease and secondary prevention strategies (Shaw et al. 2013). Managed by nurse practitioners, the interdisciplinary GRACE (Geriatric Resources for Assessment and Care of Elders) model of primary care provided significant cost savings by integrating geriatric primary care services across the care continuum (Counsell et al. 2007). Nurse practitioners provide cost-effective primary care to high-risk patient populations by proactively identifying and minimizing risk factors.

Nurse practitioners serving as providers in the primary care setting provide significant economic value by decreasing the unnecessary utilization of costly inpatient and emergency care resources. When comparing nurse practitioner and physician groups working in primary care, the evidence overwhelmingly supports equivalent or lower rates of emergency department visits for nurse practitioners (Counsell et al. 2007; Lenz et al. 2004; Paul 2000). Additionally, a high level of evidence supports equivalent or lower rates of hospital readmissions for a variety of different patient disease states, such as asthma patients discharged home and patients with heart failure managed in ambulatory care settings (Borgmeyer et al. 2008; Paul 2000). Patients with chronic congestive heart failure managed by nurse practitioners in an outpatient heart failure clinic experienced decreased emergency department visits, mean length of stay, and mean inpatient hospital charges (Paul 2000). The decrease in emergency department visits is attributed to nurse practitioner-led management of early signs and symptoms of complications in the primary care setting (Paul 2000). In doing so, the nurse practitioner assesses if the patient's concerns are

consistent with the routine recovery process and decreases unnecessary emergency room visits for minor complaints. No significant differences in frequency of health services utilization, such as specialist, emergency room, or inpatient hospital services, were discerned between nurse practitioner and physician groups that managed primary care patients at six month intervals after the patient's initial emergency department visit (Lenz et al. 2004). Similarly, no statistically significant differences were found between nurse practitioner and physician groups for any category of health services utilization six months after the patient's initial primary care visit (Mundinger et al. 2000). Patient follow-up by primary care nurse practitioners following emergency or urgent care encounters establishes more appropriate future patterns of healthcare utilization, with respect to inappropriate use of emergency department resources. This suggests more cost-effective outcomes for primary care nurse practitioners in the context of inpatient and emergency health services utilization.

By placing greater emphasis on the holistic care of patients, nurse practitioners have developed different practice patterns from those of their physician colleagues. Since different practice patterns have varying cost implications, there is potential for both cost reductions and cost increases. Although nurse practitioners are more likely to prescribe broad-spectrum antibiotics than their physician counterparts, nurse practitioner-led management is also associated with significant reductions in overall inpatient drug costs and utilization due to effective drug management strategies, such as de-escalation and intravenous-to-oral conversion (Chen et al. 2009). However, these cost savings may be offset by the longer patient consultation times of nurse practitioners, which decreases the potential number of patients that nurse practitioners may care for and treat in a specified period of time. Longer patient consultation times may be influenced by the nurse practitioner's greater emphasis on patient education and wellness care, which provide opportunities for early detection of medical problems. No

significant difference was found in the comparison of total number of laboratory tests performed between nurse practitioners and physician groups (Hemani et al. 1999). However, the number of radiologic studies ordered by nurse practitioners was found to be significantly higher than that of either residents or attending physicians (Hemani et al. 1999). Hemani et al. (1999) also found a 25% increase in specialty visits and 41% increase in hospitalizations for patients assigned to primary care nurse practitioners as compared to physicians, but these differences were not statistically significant. However, since this trend of increased utilization for patients assigned to nurse practitioners was only observed in a single study and not found to be statistically significant, the findings of this study may be considered preliminary until additional research is conducted on nurse practitioner practice patterns.

Acute Care

In the acute care setting, nurse practitioner-led care was consistently associated with lower overall drug costs for patients. Compared to the physician control group, the nurse practitioner-led care management model was associated with significant reductions in drug cost and utilization (Chen et al. 2009). Paez and Allen (2006) found that nurse practitioner-led management of patients with hypercholesterolemia following revascularization contributed to lower prescription drug costs, as patients were more likely increase compliance with the medication regimen prescribed by nurse practitioners. These findings provide additional support that management by nurse practitioners is a cost-effective approach to improve patient outcomes.

Nurse practitioners were demonstrated to provide equal or superior quality care at significantly lower costs with greater continuity and consistency in the acute care setting. In a study comparing neonatal care provided by nurse practitioners and physicians in the NICU, the costs of care provided by nurse practitioners was documented as $18,240 less per infant than those managed by physicians (Bissinger et al. 1997). This cost difference was attributable to the

nurse practitioners' combination of knowledge, communication skills, continuous presence, and early identification of service coordination needs (Bissinger et al. 1997). Evidence also demonstrates decreased cost of admission and length of stay for asthma patients managed by pediatric nurse practitioners as compared to medical residents (Borgmeyer et al. 2008). Thus, the cost-effectiveness of nurse practitioner care may be attributed to the nurse practitioners' communication skills, in regards to patient education and consistency in approach to the plan of care.

Societal Perspective

The societal perspective of cost-effectiveness analysis must consider not only those who gain health, but those who pay for it. When cost-effectiveness analysis is conducted from the societal perspective, the analysis considers "...everyone affected by the intervention and counts all significant health outcomes and costs that flow from it" (Weinstein et al. 1996). Societal resources are limited, so resources devoted to healthcare must be invested wisely.

Of principal interest to society is the education and training of healthcare providers, as both costs and benefits are borne by society at large. According to the American Association of Colleges of Nursing (2010), the cost of training for nurse practitioners represents only 20-25% that of physician training. In fact, the total cost of tuition for nurse practitioner education was less than one year of tuition for medical education (AANP 2010). Between three and seven nurse practitioners can be educated for the cost of educating one physician, and more quickly (Starck 2005). Although costs can vary from program to program, the finding that multiple nurse practitioners can be educated for the same cost as one physician demonstrates the significant economic value that nurse practitioners provide. Due to the cost-effectiveness of nurse practitioner training programs, educating additional nurse practitioners is the fastest and least expensive solution to address the provider shortage amid increasing patient demand.

Hospital and Employer Perspective

Since employers of healthcare providers are increasingly concerned with stretching limited financial resources due to restrictive budgets and cost-containment policies, salary compensation is the principal consideration for hospitals and employers. Although a formal evaluation of salary compensation is not available in the literature, the data demonstrates that nurse practitioner compensation yields significant savings as compared to physician compensation. In 2010, the mean full-time base salary for primary care nurse practitioners ranged from $87,220 (pediatric) to $90,710 (adult), while the median total base salary for primary care physicians ranged from $208,658 (family) to $219,500 (internal medicine) (AANP, 2010). The mean full-time base salary for specialty care nurse practitioners ranged from $95,770 (acute care) to $101,540 (neonatal), while the median total base salary for specialty care physicians ranged from $233,500 (endocrinology) to $532,567 (cardiac and thoracic surgeons) (AANP 2010). The average total base salary for all nurse practitioners is $92,000 (Bauer 2010). Thus, the significantly lower compensation of nurse practitioners working in primary and specialty capacities may allow hospitals and employers to allocate limited resources more effectively.

Although nurse practitioners have the potential to decrease overall healthcare costs as demonstrated in the literature, full utilization of nurse practitioners by hospitals and employers may not be realized for several reasons. Due to scope of practice regulations, nurse practitioners are not granted full autonomy and thus, physicians continue to supervise nurse practitioners. Required supervision severely compromises the cost-effectiveness of employing nurse practitioners and decreases productivity, as physicians need to spend extra time to supervise nurse practitioners (Liu and D'Aunno 2012). Furthermore, physicians continue to perform a wide variety of functions that could be transferred to nurse practitioners (Laurant 2005; Mechanic and

Aiken 1982). Liu and D'Aunno (2012) found that hiring a nurse practitioner is cost-efficient only if the nurse practitioner independently handles at least 30% of the initial patient workload. Cost-effectiveness may only be achieved if physicians invest their time in activities that only physicians can perform, such as medical functions that require their unique expertise (Liu and D'Aunno 2012). According to a RAND study conducted in Massachusetts, allowing nurse practitioners to work to their full abilities could save the state $4.2 billion to $8.4 billion over ten years (Eibner et al. 2009). Although a nurse practitioner's salary is lower than that of a physician, employing a nurse practitioner may not be effective if the nurse practitioner's capacity to contribute is underutilized due to scope of practice regulations.

Nurse Practitioner Perspective

In a sample size of ten, the majority of the participants (80%) were primary care nurse practitioners, and the remaining were acute care nurse practitioners (20%). Coincidentally, all acute care nurse practitioners interviewed worked in California, where nurse practitioners do not have full practice authority. The participants had an average of 25 years of experience as full-time or part-time nurse practitioners, which does not include prior work experience as registered nurses. Four nurse practitioners interviewed hold a Doctorate of Nursing Practice (DNP).

Table 3: Positive Indicators of Nurse Practitioner Cost-Effectiveness

(n=10, % of nurse practitioners mentioned)

Holistic Care Nursing Model	100%
Patient Partnership	100%
Patient Education	100%
Teamwork among Healthcare Providers	80%
Patient Follow-Up after Discharge	80%
Resource Utilization	70%

Table 4: Negative Indicators of Nurse Practitioner Cost-Effectiveness

(n=10, % of nurse practitioners mentioned)

Scope of Practice Regulations	100%
Restrictive Reimbursement Policies	100%
Physician Lobbying	90%
Physician Network Referral Policies	60%
Lack of Nursing Professional Advocacy	60%
Lack of Standardized Nursing Education	50%
Lack of Nurse Representation on Hospital Boards	30%
Hospital Bylaws (Acute Care NPs)	20%

Education

All nurse practitioners interviewed believed that differences in the education and training styles of physicians and nurse practitioners impacted practice patterns. Since nurse practitioners are required to gain work experience as registered nurses prior to enrolling in a Master of Science in Nursing (MSN) program, nurse practitioners integrate the holistic care model emphasized in nursing school into their practice. Health promotion, disease prevention, and patient education are central to the nursing model of care. Nurse practitioners approach patient care with components of the physician's medical model and the nurse's holistic healthcare model. However, nurse practitioners are not junior doctors or midlevel providers. When creating an optimum treatment plan, nurse practitioners integrate pharmaceutical and non-pharmaceutical interventions, primary prevention, and lifestyle modifications. Medications and potential side effects are important, but the patient's psychological state, social support system, and physical environment are central to the plan of care. Nurse practitioners create a partnership with the patient to achieve the patient's healthcare goals. In contrast, physicians follow the medical model of care, which focuses more on surgical and other short-term interventions to achieve healthcare outcomes. Medical school is symptom-focused, so physicians learn to "…treat and move on. If

you can't give the patient a pill, cut it out, or apply a machine to it, then it doesn't exist." The nurse practitioners interviewed unanimously agreed that NPs are more adept with wellness and illness prevention, as they use a comprehensive approach to care for the patient's entire being. Nurse practitioners extend their gaze beyond immediate disease and injury to understand the impact on the patient's daily function, role in family, support system, finances, and home transition. Nurses treat the entire holistic paradigm of the patient, including the patient's environment, health, and psychosocial being. The nurse practitioner plays an important role as the patient's gatekeeper to the healthcare system, especially in primary care as "…there's a whole lot of life between annual 15-30 minute office visits for healthy patients. My role is to anticipate and prevent problems for patients after they leave the office." As the patient's point of entry into the healthcare system, nurse practitioners can refer to physicians as needed if and/or when the patient's care becomes more complex. As health coaches, nurse practitioners engage in patient education to teach at-risk patients about the goal of treatment and lifestyle modifications. This emphasis on patient education increases medication and treatment compliance, which ultimately reduces costly readmissions. The nurse practitioner's niche in the healthcare system is to teach patients how to take care of themselves. When the participants shared feedback they received from physician colleagues and patients, the common thread was that the biggest advantage that nurse practitioners bring is the ability to collaborate with the patient and all members of the healthcare team to create a patient-centered treatment plan. One primary care nurse practitioner shared, "Patients have told me that their nurse practitioners perform more thorough physical examinations than physicians. Nurse practitioners really spend time to teach patients about lifestyle modifications and new medications. Patients feel comfortable because nurse practitioners take the time to answer all their questions, even ones they think are silly."

Using active listening skills honed from years of nursing experience, nurse practitioners approach patients as individuals, not cases.

All of the nurse practitioners interviewed shared that they decided to pursue the advanced degree required of nurse practitioners (Master of Science in Nursing or Doctorate of Nursing Practice) because they wanted to be more involved in patient care in order to ensure optimum patient outcomes. The vision for the Doctorate of Nursing Practice (DNP) program is to empower nurse practitioners to sit at the same table as other doctoral-prepared healthcare providers. Among the four participants with DNPs, the consensus was that although the DNP did not change their everyday practice patterns, the advanced degree extended the scope of their vision in regards to conducting patient outcome measurement and quality improvement research, integrating evidence-based practice into the clinical setting, evaluating healthcare system-wide changes and healthcare legislation, and proactively developing solutions for potential obstacles in treatment plans. One acute care nurse practitioner shared, "I am lucky to work in a service where my professional opinion as a nurse practitioner is valued and I collaborate closely with excellent physicians. Now that I have my DNP, I have the tools to get that sweet deal for other nurse practitioners." Advanced degrees empower nurse practitioners to find their professional voices and advocate for the advancement of the nursing profession. As nurse leaders, the participants with DNPs have become actively involved in hospital committees and professional advocacy organizations at local and state levels.

Reimbursement

In regards to reimbursement issues, the consensus among all the nurse practitioners interviewed was that change must come from a national level. Participants strongly believed that patients should be able to see the healthcare provider of their choice. Medicare was the first third party payer to reimburse nurse practitioners in 1997 (AANP 2013). Although insurance

companies are in the private sector domain, they largely follow Medicare's lead. Thus, free market forces and legislation do not necessarily influence reimbursement policies. When nurse practitioners practice in states that grant full practice authority, they provide the same level of care and conduct the same assessments as physicians. However, they only receive a fraction of the reimbursement that physicians receive for the same code. Medicare currently reimburses nurse practitioners at 85% of the physician rate for providing the same services (AANP 2013). One Arizona primary care nurse practitioner expressed her frustration by asking, "What 15% of the procedure do they not want me to do? What else do I need to do to get the extra 15%?" The consensus among all nurse practitioners interviewed was that insurance companies must provide equal payment for nurse practitioner services. The participants attributed the reimbursement difference to bias against nurse practitioners. Insurance companies "…claim to reimburse physicians more because they have the capacity to provide additional care, likening the difference between physicians and nurse practitioners to the gap between Level 3 trauma centers and community hospitals." When patients are covered by an insurance plan that does not provide reimbursement for nurse practitioners, they must either pay out-of-pocket or see a physician for their care. Since this creates a monopoly of patients for physicians, this is not an effective market allocation of resources. Furthermore, a lower reimbursement rate for nurse practitioners is detrimental to NP employment because private practices and hospitals alike want to be reimbursed at the maximum amount. With lower reimbursement rates, nurse practitioners do not generate as much revenue.

The focus on illness care and the medicalization of diseases ensures that preventative care and patient education have fewer and no reimbursement codes, respectively. Since nurse practitioners are constrained by the same time limits that physicians experience, they may not have the time to teach patients about lifestyle modifications and answer questions if

reimbursement policies remain the same. Participants expressed concern that the focus on patient education may diminish when nurse practitioners are pressed for time due to changing regulations. This comes at a cost, as lifestyle modifications achieved through patient education may rank among the most cost-effective patient interventions. One nurse practitioner acknowledged the Affordable Care Act's emphasis on preventative care as a step in the right direction, as the shift from illness care to preventative care will promote healthier outcomes and lower long-term costs.

Although Arizona has provided nurse practitioners with complete autonomy in regards to scope of practice laws since the passing of the Arizona Nurse Practice Act fifteen years ago, the number of nurse practitioner-led practices have not increased. Nurse practitioners interviewed in Arizona attributed this to reimbursement policies, which lead to insufficient revenue to support and sustain the practice. Since reimbursement rates are merely a fraction of physician rates and overhead expenses for starting a practice are the same for nurse practitioners and physicians, nurse practitioners experience a significant financial disadvantage. One Arizona primary care nurse practitioner shared, "There were many weeks that I could not afford to pay myself because I started to turn a profit only after 2.5 years. I had to support myself with a second job, but not everyone the financial luxury of a second source of income." Due to financial instability, nurse practitioners may be hesitant to open their own practices without a second job. One Arizona primary care nurse practitioner stated, "We are not going to achieve the full potential of the nursing profession if we only become employees of physicians. To serve the growing patient population, nurse practitioners need to open and sustain their own practices.

Scope of Practice

Participants interviewed in both Arizona and California called for standardized autonomy and scope of practice across the nation, as there are only 21 states with independent nurse

practitioner practice authority. Nurse practitioners must be used to their fullest extent in primary and acute care to further enhance the cost-effectiveness of the healthcare system. Although NP students across the country must fulfill the same training and national board certification requirements, nurse practitioners living in different states cannot practice at the same level. By providing opportunities for nurse practitioners to care for more patients through increased scope of practice, the healthcare system enjoys significant cost savings through salaries alone.

In Arizona, nurse practitioners have the right to full scope of practice without physician oversight. Arizona participants attributed Arizona's early adoption of full scope of practice to the state's geography and historical shortage of physicians. Boasting only three major metropolitan centers in Phoenix, Tucson, and Flagstaff, Arizona has significant rural and underserved populations with pressing needs for primary care providers. Historically, nurse practitioners formed the majority of providers available to treat the state's significant Native American population.

Senate Bill 323 would have granted full practice authority to California nurse practitioners, but its defeat in the California State Assembly may be attributed in large part to physician lobbying interests. Since the California Association for Nurse Practitioners is the sole professional group that represents nurse practitioner interests in California, one California primary care nurse practitioner likened Senate Bill 323's likelihood to pass against the American Medical Association's lobbying budget to the battle between David and Goliath – without David's underdog triumph. The overwhelming majority (90%) of the participants believed that some physicians initially thought that nurse practitioners wanted to take their jobs, so they opposed NPs on the grounds of competency. Physicians may claim that they are concerned about patient safety, but this concern is largely unfounded as the literature demonstrates that nurse practitioner-managed care leads to equal or higher patient satisfaction and healthcare outcomes.

Many (60%) of participants believed that physicians are concerned about the financial implications of overlapping scopes of practice. One Arizona primary care nurse practitioner suggested that there would be no physician opposition of nurse practitioners if NPs offered their services for free. Physician incomes may actually increase when nurse practitioners are responsible for primary care, as physicians are available to see the more complex cases that are reimbursed at higher rates. The American Medical Association claims that nurse practitioners are not as capable as their physician colleagues, which propagates the public's bias towards nurse practitioners as healthcare providers. In response to the Institute of Medicine's *Report on the Future of Nursing*, a board member of the American Medical Association stated, "Most nurse practitioners have just two to three years of postgraduate education and less clinical experience than is obtained in the first year of a three year medical residency. These additional years of physician education and training are vital to optimum patient care" (AMA 2010). In arguing why nurse practitioners should not be independent healthcare providers, the American Medical Association capitalizes on the lack of standardization in nursing education. Participants identified this as a major weakness of the profession. The nurse practitioners interviewed also identified the lack of role standardization as the most significant challenge for the nursing profession as a whole. One Arizona acute care nurse practitioner stated, "We create our own professional barriers because we are focused on our respective degrees and territories. Even without the changing healthcare system regulations and opposition from other stakeholders, we would have significant challenges within the profession." Since nurses have historically disagreed on this issue even among themselves, this is a significant barrier in the struggle for recognition as independent healthcare providers.

Practice Patterns

Since nurse practitioners occupy a unique role at the crossroads of medicine and nursing, they are more likely to catch nuances that translate into opportunities for the healthcare system to save limited resources. The nursing model focuses on the prioritization of problems and interventions, so nurse practitioners approach care by ruling out emergent diagnoses and determining differential diagnoses. Nurse practitioners work from the bottom up. On nurse practitioner practice patterns, one Arizona primary care nurse practitioner stated, "If it's a vague complaint, NPs conserve resources by utilizing the least expensive test first and ruling out differentials at that point. We reserve more expensive tests for acutely ill patients who are negative on previous tests." One California acute care NP explained that generally, physicians are more likely to run tests and nurse practitioners are more likely to examine the patient. The nurse practitioner's first line of defense is physical examination, not resource utilization. One Arizona primary care nurse practitioner stated simply, "We save money because we don't repeat unnecessary testing and we keep people out of the hospital." Nurse practitioners go above and beyond to provide cost-effective care for patients by considering what insurances can cover and what patients can afford. One participant stated, "Physician colleagues tend to only order first-line medications, but nurse practitioners tend to take the time to look up what is covered by the patient's insurance plan." This focus on cost-effective resource utilization may be emphasized in nursing school, as nurses are taught to consider the patient's financial situations in the context of evaluating medication compliance. Maximizing limited resources is a core pillar of nursing.

Acute Care

The consensus among all participants was that acute care nurse practitioners were restricted by additional scope of practice barriers, which limited the extent of their cost-effectiveness. This was attributed to the constraints of the hospital system. Although state laws

may permit nurse practitioners to practice independently, hospital bylaws present significant barriers to acute care practitioners, as they do not permit independent practice by nurse practitioners. For example, acute care nurse practitioners are the first responders if patients have an issue, but they must follow up with physicians prior to implementing the treatment plan. According to Medicare regulations, nurse practitioners cannot admit or discharge patients independently. Nurse practitioners working in these acute care environments may only provide care with collaborating physicians, even in states with full practice authority like Arizona. With these constraints, acute care nurse practitioners cannot practice to the upmost of their training and abilities. This is not a cost-effective allocation of limited resources.

Discharge

Nurse practitioners are often not included on rotating referral groups or insurance plans, so they lose potential patients who were either uninsured or did not have primary care providers. The exclusion of nurse practitioners on the provider list may be due to medical staff bylaws, which are physician-driven. Unless nurse practitioners have pre-existing relationships with patients, it is challenging for nurse practitioner to get direct referrals when patients are discharged from the hospital. The physician network deterred patients from receiving nurse practitioner-managed care, even when the physicians in primary care practices were not able to see patients in an appropriate time frame after hospital discharge. If providers do not follow up with patients after discharge, patients fall through the cracks and wait to seek help until it is too late. This increases the risk for costly hospital readmissions.

Employment

The consensus among all participants was that healthcare systems underutilize nurse practitioners due to unfamiliarity with the professional role and scope of practice of nurse practitioners. Every healthcare system utilizes nurse practitioners in varying capacities because

of differing practice models and physician experiences with nurse practitioners. This is especially pronounced in California, where nurse practitioners do not have full practice authority. Nurse practitioners in California and Arizona alike expressed frustration towards the inconsistency among different employers, as stakeholders within healthcare systems did not understand their scopes of practice. One Arizona primary care nurse practitioner whose clinic is affiliated with a national health system expressed frustration with her employer's lack of knowledge about her full practice authority, as they employ practitioners in different states across the country. One California acute care nurse practitioner shared, "In the beginning, they simply didn't know what to do with us. Over time, different services in my hospital have observed the success of nurse practitioner integration, so they want nurse practitioners for their own service lines." Nurse practitioners are their own best advocates. They must continue to educate employers about their scope of practice to ensure future reform, which will lead to more cost-effective opportunities.

As the professional boundaries between the domains of medicine and nursing continue to shift, nurse practitioners may continue to be underutilized because some physicians perceive competition from nurse practitioners. An Arizona primary care nurse practitioner working in a community clinic for underserved populations stated, "Physician colleagues don't understand the scope of practice for nurse practitioners, especially in community clinics where nurse practitioners take on more responsibilities due to limited resources." This may also be common in the acute care environment, as acute care nurse practitioners have similar roles as hospitalists. Some Arizona nurse practitioners attributed the underutilization of nurse practitioners to the lack of leadership opportunities available for nurse practitioners in the Accountable Care Organization (ACO) environment, as nurse practitioner-led practices cannot be part of ACOs. Furthermore, there is a dearth of nurse practitioner representation on hospital boards. Most

medical staff committees in hospitals are physician-driven. Some healthcare systems do not permit nurse practitioners to sit on these patient care committees. All of the nurse practitioners interviewed called for changes on a national scope regarding employer education, as it is difficult to achieve consistency at the individual state level.

Professional Advocacy

The overwhelming majority (90%) of the nurse practitioners interviewed shared the belief that the nursing profession needs to increase its political advocacy efforts. One Arizona primary care nurse practitioner commented, "Nurses and nurse practitioners sacrifice our personal needs for the needs of our patients. We put ourselves on the back burner for our patients." Similarly, one California primary care nurse practitioner stated, "We're so used to advocating for our patients that we don't advocate for ourselves professionally." Although the public has consistently ranked nurses as the most trusted and ethical profession year after year (Riffkin 2014), the participants shared that they are not necessarily comfortable with stepping up and lobbying for their rights as healthcare providers. Since most patients become loyal champions once they receive care from nurse practitioners, one participant suggested that NP lobbying efforts should start with encouraging patients to share positive experiences with state representatives, as well as hospitals, clinics, physicians, and other key stakeholders.

Teamwork

The consensus among participants was that both nurse practitioners and physicians have an important place in the patient's healthcare team. Once physicians collaborate with nurse practitioners, they "…get past the learning curve and realize that nurse practitioners are not trying to compete with physicians. They recognize that nurse practitioners are a financial boom and asset to their practices." One California acute care nurse practitioner described her relationship with surgeons on her trauma service as collaborative. She shared, "They always ask

for and respect my professional opinion. If I disagree with a treatment decision, they will listen to me." Both roles are needed to achieve the best patient outcomes. One California acute care nurse practitioner stated, "We're not trying to take their jobs. We're all working towards the same goal of covering all the patients who need care. We need all the providers we can get." When the healthcare provider team is not cohesive, patient outcomes suffer. The domains of medicine and nursing can complement each other, but professional boundaries must be negotiated and refined as time passes. One Arizona primary care nurse practitioner stated, "Nurse practitioners shouldn't aspire to be physicians. Likewise, physicians shouldn't worry about trying to be nurse practitioners." If physicians and nurse practitioners each work to the highest of their education and training, then there will be enough providers to care for all patients.

DISCUSSION

As the literature suggests that nurse practitioners provide equal or more cost-effective care than physicians in addition to increasing the quality and availability of healthcare services, nurse practitioners and physicians may serve as substitutes for each other in the healthcare marketplace – particularly in primary care settings. The most cost-effective solution is to increase utilization of nurse practitioners, as the literature demonstrates that they are the less costly healthcare provider from all stakeholder perspectives. This literature review provides the necessary data to lower and eventually eliminate nurse practitioner practice barriers such as reimbursement policies, prescriptive authority, and scope of practice regulations. As Bauer (2010) discusses, healthcare costs may be reduced by minimizing regulations that utilize higher cost health care providers for services that may be provided with comparable results and lower costs by nurse practitioners. Both economic and clinical gains may be realized by allowing nurse practitioners to practice at their full and legally defined scopes of practice.

These findings have the potential to inform scope of practice reform, ensuring the availability of cost-effective providers to respond to increasing patient demand in the context of the Affordable Care Act. When nurse practitioners practice at the fullest extent of their education and training, this lowers overall healthcare costs and cuts unnecessary spending to ensure the most effective allocation of limited resources in the American healthcare sector. In 2010, the Institute of Medicine recommended that nurse practitioners should be free to "practice to the full extent of their education and training" with the release of *The Future of Nursing: Leading Change, Advancing Health* report. This landmark report advocated for changes in scope of practice regulations by examining characteristics of the nursing workforce. Perryman Group (2012) projected that decreased scope of practice regulations would lead to over $16 billion in immediate savings that increase over time. Thus, increased utilization of nurse practitioners will increase the cost-effectiveness of the healthcare system. Funds allocated to meeting reform goals is "...wasted, as long as regulations hinder utilization of less expensive, equally qualified nurse practitioners" (Bauer 2010). Denying access to cost-effective nurse practitioners drives costs up.

Since the issuance of medical licenses has historically fallen under the jurisdiction of states, Congress has not addressed nurse practitioner scope of practice regulations (Iglehart 2013). The Institute of Medicine report emphasized that the Federal Trade Commission has a long history of "targeting anticompetitive conduct in healthcare markets by responding to potential policies that might be viewed predominantly as guild protection rather than consumer protection" (Iglehart 2013). Ongoing activities by the Federal Trade Commission related to scope of practice regulations and their effect on competition in the healthcare marketplace has gained momentum.

Furthermore, these findings may promote the clinical preceptorship of NP students by increasing Medicare hospital funding for the education of nurse practitioners. Medicare provides

66% of nurse training funds for hospital-based diploma nursing programs, which produce fewer than 10% of nurse graduates (Aiken and Gwyther 1995). Since the majority of Medicare nursing education funds is distributed to hospitals associated with increasingly smaller subset of nursing training programs, Medicare reimbursement for nursing education may be better allocated for the clinical training of nurse practitioners and other advanced practice registered nursing (APRN) students (Aiken and Gwyther 1995). Under the Graduate Nurse Education (GNE) Demonstration, Medicare will provide reimbursement to five selected hospitals nationwide for the cost of providing clinical training to APRN students, increasing the supply of APRNs to provide greater access to primary care services (CMS 2012). Since the high costs of clinical training have historically limited hospitals and other healthcare providers from accepting more APRN students for clinical training, the cost-neutral shift of Medicare funds from hospital-based diploma nursing programs to APRN clinical preceptorship programs reflects an increased recognition of the substitution of nurse practitioners for physicians in overlapping scopes of practice (CMS 2012). Most nurse practitioners interviewed were not knowledgeable about the GNE demonstration, but the reaction was overwhelmingly positive once they learned about the demonstration's goal to increase the number of clinical placements for nurse practitioner students. Prior to the GNE demonstration, clinical preceptors were volunteers and did not receive payment for their work. One primary care nurse practitioner stated, "Since clinical sites were limited, residents were often chosen over nurse practitioner students because they were funded." Currently, the GNE demonstration only pays clinical preceptors at five participating clinical sites, one of which is Arizona's Scottsdale Healthcare Medical Center. One Arizona primary care practitioner commented, "It is not a sustainable model. Clinical preceptors will not take nurse practitioner students in clinical sites that have not been chosen for the Demonstration. Preceptors will not volunteer when they could be paid for the same work." Thus, there is a shortage of

clinical preceptors at unpaid sites. Since the literature strongly suggests that nurse practitioners provide equal or more cost-effective care than their physician counterparts, this demonstration may evolve into a policy change for NP students at all hospitals, paralleling Medicare's Direct Graduate Medical Education payments for residents.

Limitations

Limitations found in the literature may limit the accuracy of conclusions drawn from the literature review. Differences in individual patient variables, such as comorbid conditions or severity of illness, may not be adequately controlled for and captured in the data. Observational studies may be subject to omitted variables bias, as randomized controlled trials are rare outside of clinical trials. Several studies investigating whether assignment to different types of providers would influence resource utilization lacked statistical significance due to the wide variation in utilization rates for individual patients. Each research study investigated a single dimension of nurse practitioner cost effectiveness, and often from only one stakeholder perspective. Therefore, the synthesis of many isolated study results may not paint an accurate picture of overall nurse practitioner cost effectiveness.

Most studies demonstrating nurse practitioner cost-effectiveness are fairly short-term scenarios, which have both advantages and disadvantages. Since payers switch insurance carriers frequently, payers are looking for short-term metrics and may not necessarily be interested in long-term outcomes. The timeline for cost-savings research must be short to capture the attention of stakeholders. Nurse practitioners working in hospital settings often care for patients with short-term and highly acute conditions. However, nurse practitioners working in primary care settings frequently manage chronic conditions, which require long-term treatment. Thus, the cost-effectiveness of primary care nurse practitioners may not be adequately captured in these studies, as the benefit of NPs may be even greater than represented in short-term studies.

The search for relevant literature was limited to studies found through database search. In the future, the search may be extended to book chapters and more elaborate citation tracking. The limited number of relevant studies may require caution in the interpretation and synthesis of study findings, as results may be influenced by variations in the practice of individual providers.

Since nurse practitioners were the sole stakeholders that agreed to be interviewed, this may contribute to opinions that are biased towards nurse practitioners with regards to cost-effectiveness. Thus, additional research involving participants with diverse stakeholder interests would provide a more balanced conversation surrounding nurse practitioner cost-effectiveness.

Shifting professional boundaries between the domains of medicine and nursing will continue to create both challenges and opportunities for nurse practitioners in the future. Future research may illuminate these boundaries as an important barrier, as well as a potential facilitator in task reallocation. Nurse practitioners may experience challenges as they continue to practice in specialty areas, as specialists may feel that nurse practitioners are replacing them or encroaching into their territory. Furthermore, nurse practitioners may experience friction as they move into more urban centers with a greater density of healthcare providers, as opposed to underserved rural areas. Future research may also provide more information about the effect of differences in the training of physicians and nurse practitioners on the use of diagnostic testing and referrals. Additional research exploring increased resource utilization by nurse practitioners will provide more information about the overall costs of nurse practitioners.

In contrast to the most cost-effective practitioner, the most cost-effective model may involve the interdisciplinary collaboration of nurse practitioners and other health professionals on care delivery teams, including teams led by nurse practitioners. This integrates the capacity of providers by allowing capacity pooling and shared-panel workload allocation. However, this model is not based on empirical evidence. Depending on the degree of collaboration and/or

supervision of nurse practitioners, the cost-effectiveness of this model may be limited. Furthermore, interprofessional educational opportunities are few and cultural change is difficult. Further research may strengthen the connection between lower per-patient costs and care provided by teams of nurse practitioners and other caregivers.

CONCLUSION

With robust evidence supporting the ability of nurse practitioners to provide cost-effective care and economic value, nurse practitioners are well positioned to meet anticipated physician shortages and increasing patient demand. Evidence from the literature review supports the substitution of nurse practitioners for physicians in their overlapping scopes of practice. The success of the Affordable Care Act depends on a robust and interdisciplinary workforce that utilizes all providers to the fullest extent of their education, knowledge, and scope of practice. The cost-effectiveness goals of the Affordable Care Act may be accomplished with nurse practitioners serving as providers of a wide range of services to patients in a variety of primary and acute care clinical settings. To bridge the provider gap and create innovation in healthcare delivery, nurse practitioners need to practice to the fullest extent of their scope of practice. Increasing the availability of nurse practitioners to meet the needs of the changing patient population will decrease overall healthcare costs while providing equal or superior quality of care.

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Appendix A: Arizona Interview Guide

1. Although Arizona has provided nurse practitioners with complete autonomy in regards to scope of practice laws for fifteen years, this has not increased the number of nurse practitioner-led practices due to insufficient revenue to support and sustain the practice. What are your thoughts on solutions to address reimbursement issues?
2. The literature suggests that nurse practitioners are the least costly healthcare provider from all stakeholder perspectives. Drawing upon your clinical expertise and past experiences, what are your thoughts on the utilization of nurse practitioners by hospitals and health systems?
3. With regards to scope of practice barriers, what are the different challenges for primary care nurse practitioners versus acute care nurse practitioners?
4. Do the differences in the education and/or training styles of physicians and nurse practitioners impact practice patterns? If so, how?
5. What are your thoughts on the Medicare Graduate Nurse Education Demonstration?
6. What opposition and/or sources of dissatisfaction have you encountered in the substitution of nurse practitioners for physicians in their overlapping scopes of practice?
7. Drawing upon your clinical expertise and past experiences, what opportunities do you see to further enhance the cost-effectiveness of nurse practitioners?
8. What challenges do you anticipate in the future as professional boundaries between the domains of medicine and nursing continue to shift?

Appendix B: California Interview Guide

1. Senate Bill 323 will grant full practice authority without physician supervision for California nurse practitioners if the bill passes the California State Assembly (http://canpweb.org/advocacy/senate-bill-323-resource-center/). Historically, California nurse practitioners have practiced under collaborative written agreements with physicians. What are your thoughts on solutions to address scope of practice laws, as well as reimbursement issues?
2. The literature suggests that nurse practitioners are the least costly healthcare provider from all stakeholder perspectives. Drawing upon your clinical expertise and past experiences, what are your thoughts on the utilization of nurse practitioners by hospitals and health systems?
3. With regards to scope of practice barriers, what are the different challenges for primary care nurse practitioners versus acute care nurse practitioners?
4. Do the differences in the education and/or training styles of physicians and nurse practitioners impact practice patterns? If so, how?
5. What are your thoughts on the Medicare Graduate Nurse Education Demonstration?
6. What opposition and/or sources of dissatisfaction have you encountered in the substitution of nurse practitioners for physicians in their overlapping scopes of practice?
7. Drawing upon your clinical expertise and past experiences, what opportunities do you see to further enhance the cost-effectiveness of nurse practitioners?
8. What challenges do you anticipate in the future as professional boundaries between the domains of medicine and nursing continue to shift?