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Rebecca Huffer Burpo
rburpo@swbell.net

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EXPLORATORY DESCRIPTIVE REVIEW OF CERTIFIED NURSE-MIDWIFERY

EXPLORATORY DESCRIPTIVE REVIEW OF CERTIFIED NURSE-MIDWIFERY
OUTCOMES RELATED TO SCOPE OF PRACTICE LEGISLATION

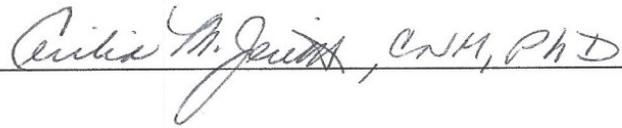
Submitted to the Faculty
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Doctor of Nursing Practice

Rebecca Huffer Burpo

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This capstone is accepted in partial fulfillment of the requirements for the degree Doctor of Nursing Practice.



Cecilia M. Jevitt, CNM, PhD, FACNM

March 30, 2017

EXPLORATORY DESCRIPTIVE REVIEW OF CERTIFIED NURSE-MIDWIFERY

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Signed: *Rebecca H. Burpo*

March 30, 2017

Exploratory Descriptive Review of Certified Nurse-Midwifery Outcomes Related to Scope of
Practice Legislation

Access to care is a problem in medically underserved areas throughout the US. In addition, rising perinatal mortality rates have pivoted attention onto possible correlations between these two issues. Several reports recommend the use of advanced practice registered nurses (APRN) or certified nurse-midwives (CNM) as a solution to these healthcare problems (American College of Nurse-Midwives [ACNM], Accreditation Commission for Midwifery Education [ACME], & American Midwifery Certification Board [AMCB], 2011; APRN Joint Dialogue Group, 2008; Renfrew et al., 2014; Robert Wood Johnson Foundation, 2011). However, scope of practice barriers currently prevent full utilization of APRNs and CNMs (Hartley, 1999; LeBuhn & Swankin, 2010; Sekscenski, Sanson, Bazell, Salmon, & Mullan, 1994). These legislative restrictions vary in burdened states, ranging from full physician control to various levels of physician supervision, often disguised with the euphemism of “collaboration”. This connotative use of collaboration is different from the collaboration of working together that naturally occurs as part of competent practice.

According to Kinzelman and Bushman (2015), 25 states have some type of restriction on the practice of midwifery (Figure 1). Restriction takes many forms including, for example, requiring that a physician file a letter with the professional regulatory board attesting to supervision of the APRN or CNM; requiring the filing of physician-signed protocols with the professional regulatory board; and sometimes physicians charging fees for supervision. Some states regulate the geographic proximity of supervising physicians to APRNs and CNMs and the ratios of physicians to APRNs and CNMs. Often, these legislated restrictions present in a subtle

manner. The statute defining midwifery may describe it as autonomous practice; however, the prescribing of medications may be viewed as a medical act requiring supervision. Even though midwives are educated in pharmacology and the prescribing of medications is a core practice competency (ACNM, 2012), the restriction can make it impossible to practice without a physician nearby. For example, a 2016 workforce survey of Texas CNMs cited the inability to find a physician to sign the collaborative agreement as a reason for not practicing their profession (Hastings-Tolsma et al., 2017)

Several systematic reviews (Johantgen et al., 2012; Laurant et al., 2005; Sandall, Soltani, Gates, Shennan, & Devane, 2013; Sutcliffe et al., 2012) report that APRN and CNM care is equal quality to physician care for the scope of practice provided; yet, some lawmakers have indicated that they will not legislate autonomy until research demonstrates safety without physician supervisory regulations. By insisting on physician supervision of another profession, lawmakers ignore the autonomy that is inherent in a profession (Poulton, 2004). Instead, they adhere to Gardner's (2010) perspective that scope of practice conflicts include "values-based and professional identity-based issues" (p. 264). Furthermore, their position indicates acceptance of the physicians' values and self-identity as the ultimate authority on health care.

When enacting legislation requiring physician supervision, lawmakers perceive that they are ensuring their constituents' health. Thus, they are responsible for the effects of the legislated restrictions. To effect change that may ultimately improve the public health of a state's citizens, it is necessary to provide evidence that will influence politicians to broaden their perspective on healthcare regulation. The goal of this study was to determine if state legislation restricting the scope of midwifery practice affected the care provided by midwives to childbearing women and

their babies. Are the outcomes of care provided by midwives contingent on physician supervision and a state's regulatory levels?

Review of the Literature

Scope of practice legislation provides oversight of professions concerned with life and health. Yang, Attanasio, & Kozhimannil (2016) suggest that scope of practice laws play a role in shaping the maternity workforce and access to care, as well as the maternal and infant population health. To examine fully what impact these laws have on the overall population health, it is necessary to evaluate the evidence from the interrelated perspectives of scope of practice legislation, the measurement of patient safety, certified nurse-midwifery practice, and universally accepted adverse pregnancy outcomes.

Legislation.

Several expert opinions support the premise that scope of practice barriers limit access to care (ACNM, ACME, & AMCB, 2011; APRN Joint Dialogue Group, 2008; Dower et al., 2013; Robert Wood Johnson Foundation, 2011). In reviewing the impact of scope of practice legislation on access to safe care, Reagan and Salsberry (2013) highlighted the fact that the greatest concentration of vulnerable populations reside in states with restrictive scope of practice laws. Declercq (2012) cited a large variation in the percentage of midwife-attended births from state to state in 2009, ranging from 0.8% in Arkansas to 23.9% in New Mexico. After acknowledging a poor understanding of the difference, he cited the political environment and women's access to midwifery care as likely influences. In addition, Knudston (2004) emphasized that no studies to date have shown that greater restrictions on nursing practice increase patient safety.

Several studies have demonstrated an association between scope of practice and workforce. Sekscenski, Sansom, Bazell, Salmon, & Mullan (1994) provided evidence that restrictive practice statutes negatively influence a state's healthcare labor market, contributing to the access to care problem. Declercq, Paine, Simmes, & DeJoseph's (1998) survey of state policies between 1991 and 1995 found that the distribution and practice activities of CNMs was inversely associated with state scope of practice regulations. Yang and colleagues (2016) extended this research to include vital statistics birth data, also finding a positive association between state policies of autonomous midwifery practice and a larger midwifery workforce. They found a mean of 4.85 CNMs per 1,000 births in autonomous practice states, compared with 2.17 CNMs per 1,000 birth in states where CNM practice is subject to supervision or collaborative agreements.

In contrast, Hartley (1999) approached the scope of practice issue from a social science perspective. She examined multiple variables in managed care markets, including the supply of CNMs, scope of practice barriers, and physician dominance. She found a positive association between favorable scope of practice state policies and the supply of CNMs; however, physician dominance decreased. In medical sociology, physician dominance is the control of the professional physician group over other health care occupations and this control is at risk when CNM practice increases (Hartley, 1999). This agrees with Gardner (2010) who contends, "Members of groups with identities that place a high priority on being treated with deference have difficulty compromising or respecting other groups" (p. 265). These interprofessional issues may substantially influence legislation.

Regardless of the rationale, the literature supports an association between scope of practice barriers and access to care. Reports, white papers, and health policy commentaries

(ACNM, ACME, & AMCB, 2011; APRN Joint Dialogue Group, 2008; Robert Wood Johnson Foundation, 2011) call for aligning the APRN scope of practice state policies with professional competence. The consensus of this literature is that current legislative actions prevent the effective use of a state's workforce to improve access to care for vulnerable populations.

Patient safety.

Opposition to autonomous practice generally presents as a safety concern. Physician groups contend that they are the only standard of patient safety; however, the measurement of patient safety has developed into a complex field with a variety of processes and outcomes. The review of safety literature includes empirical studies and systematic reviews, methodological or data analytic approaches, and theoretical articles. In examining the outcomes of empirical studies and systematic reviews, researchers concluded that APRN care is safe for patients when compared to physician care (Johantgen et al., 2012; Laurant et al., 2005; L.M. Schimmel, Lee, Benner, & Schimmel, 1994; Sutcliffe et al., 2012).

In three systematic reviews (Johantgen et al., 2012; Sandall, J. et al., 2013; Sutcliffe et al., 2012) nurse-midwives compared favorably with physicians on various outcomes, such as preterm birth, low birth weight infants, and patient satisfaction . Although the researchers cited mortality and morbidity statistics, the reviews determined patient safety based on the physician outcomes, instead of a national or international standard. Thus, the conclusions were limited. Two additional primary studies include Levy, Wilkinson, & Marine's (2005) retrospective study of 4,300 births over a 5-year period in Madera County, California. The investigators measured newborn indices before, during, and after a 3-year demonstration project where CNMs relieved a physician shortage in a rural county hospital (p. e10). A significant decrease in prematurity and neonatal mortality occurred when midwives managed the majority of the pregnancies and

attended 78% of the births (p. e11). A year after the project ended, with the reinstatement of the physician model, the prematurity rate rose 50% and the neonatal mortality rate among women receiving prenatal care increased almost fourfold (p. e16). The second study compared outcomes in a joint practice (nurse practitioners [NP], nurse-midwives, and physicians) with a physician practice, finding equivalent or better outcomes with the joint practice (Schimmel et al., 1994).

Other investigators sought to evaluate patient safety with more objective measures than physician care. Cragin & Kennedy (2006) measured safety with indicators of optimal care—what should happen. They found that the decreased use of technology and interventions resulted in no difference in neonatal outcomes, even when controlling for preexisting risk. In another approach, O'Brien et al. (2011) used Canadian women's perceptions of their outcomes as the standard to compare physicians, midwives, and nurses. Midwifery care was associated with equivalent or better outcomes and higher patient satisfaction than the Canadian maternity care standards. This study, however did not address mortality or severe morbidity. In viewing CNM outcomes based on their autonomy, Yang et al. (2016) found that women in states with autonomous midwifery practice had 13% lower odds of cesarean section and preterm birth, and 11% lower odds of delivering a low birth weight baby compared to women birthing in states with more restrictive practice. Although this does not imply correlation, it does suggest that state policy restrictions may negatively influence CNM safety. Finally, Knudtson (2004) analyzed 13 years of reported malpractice cases in the National Practitioner Data Bank (NPDB) and concluded that APRN and CNM practice is safe because there was no correlation between the type of scope of practice laws and the rates of malpractice events (p. 32).

Some authors have critiqued current safety measurement data and indicators, such as those used by the National Practitioner Data Bank (NPDB) (Knudtson, 2004), Medicaid files (Sonenberg, 2010), the Agency for Healthcare Research and Quality (AHRQ) (Grobman, Feinglass, & Murthy, 2006), and the Centers for Disease Control and Prevention's (CDC) Vital Statistics (Creanga et al., 2014; MacDorman, Declercq, Cabral, & Morton, 2016). Reporting issues, data retrieval problems, hospital-influenced indicators, and outdated documentation formats diminish the usefulness of these safety measurements. (Grobman, et al., 2006; Knudtson, 2004; MacDorman et al., 2016; Sonenberg, 2010). Other researchers have sought to improve the reliability and validity of quality frameworks, (Cragin & Kennedy, 2006; Renfrew et al., 2014), Alternative evaluation frameworks possess strengths; however, no single method or tool has yet been adopted within the industry

The evolution of knowledge about patient safety has driven the development of indicators and instruments. Theoretical articles have moved away from the perception that the provider or specific biomedical interventions are the sole determinants of safety (Woolf, 2004; Drife, 2001; Horton & Astudillo, 2014). Renfrew et al. (2014) have developed a quality framework for maternal and newborn care that focuses on what women, their babies, and their families require. With this central focus, the investigators have identified what health systems need to provide the services and how to deliver them (p.18). They conclude that multiple outcomes improve with practices that fall within the scope of midwifery (p. 13).

Expanding to the entire health care system, Woolf (2004) constructed a concentric model in which safety is a small, but important component of *quality issues*, and these quality issues comprise a large portion of a system's *lapses in caring*. He contended that the healthcare system needs solutions to solve these lapses in caring: access problems, health inequities, and lack of

infrastructure for health promotion and chronic disease management (Woolf, 2004). Woolf (2004) predicts that this could lower morbidity and mortality on a scale unattainable with a focus solely on safety. Horton and Astudillo (2014) reinforced this perspective, commenting that lifesaving interventions are insufficient by themselves. Interdisciplinary, integrated services need equally meticulous attention for quality (p.1). These expert opinions call for a more sophisticated approach of focusing on the evaluation of performances by their effect on population health. In conclusion, the patient safety literature presents multiple perspectives. Traditionally, quantitative research methodologies have utilized physician care as the standard of patient safety. However, multiple studies have sought to validate safety measurements for describing CNM outcomes. Within the past decade, a global theoretical trend towards identifying health-supporting systems of care has emerged. These interwoven approaches demonstrate a transitional state in which the designation of physician care as the standard of safety is insufficient to address health system complexities.

Certified Nurse-Midwifery.

In justifying their self-identity as the authority on patient safety, physicians cite their educational preparation as being longer and more expansive than that of midwives. Consequently, they view themselves as a higher-level provider and the rightful supervisors of a middle level of care provided by CNMs. However, the competency-based education used in U. S. nurse-midwifery education, organizes around competencies, derived from an analysis of societal and patient needs. It emphasizes the demonstration of outcome abilities, and deemphasizes time-based training (Frank et al., 2010). Consequently, the direct parallel to the length of physician training is invalid.

Furthermore, in the classic treatise on the midwifery model of care, Rooks (1999) demonstrated that midwifery and medical obstetrics are separate but complementary professions with different philosophies and overlapping, but distinct, purposes and bodies of knowledge. Physicians are experts in pathology and midwives are experts in normal pregnancy, as well as meeting the other, non-pathologic needs of pregnant women. Both medicine and midwifery are valid and important, complementary versus competitive. The full breadth of each is not accessible by the other.

This separate body of knowledge is one of the criteria of a profession (Poulton, 2004). Other investigators have also studied the unique midwifery role. Schimmel and colleagues (1994) concluded two decades ago that CNMs and NPs in a joint practice “provide a knowledge base of concrete practice skills that provide an alternative to surgical or instrumental intervention; and, the researchers identify this alternative as crucial to excellent care” (p. 203). Similar findings have concluded the following: the midwifery model results in outcomes equivalent or better than those of the biomedical model (MacDorman & Singh, 1998); midwifery care is associated with important benefits to the mothers (Fraser et al., 2000); and midwifery patients receive more *optimal* care processes (Cragin & Kennedy, 2006). Furthermore, the findings of O'Brien et al. (2011) and Renfrew et al. (2014) distinguished the midwifery model from the biomedical model, characterizing midwifery as continuity of care, promotion of normality of birth, and efficient utilization of resources. Renfrew et al. (2014) also described CNMs as most effective when integrated into the health system as autonomous practitioners within an interdisciplinary team. The evidence demonstrates a clear description of the unique professional contribution of midwives to health care that is not subservient, extended, or

midlevel practice. Rather, midwives are autonomous professionals who integrate effectively into the health care system.

Pregnancy

There are many perspectives on what constitutes poor pregnancy outcomes. Despite controversies, the public and the professions agree that prematurity and mortality indicate a lack of health care quality. Maternal mortality is rising (MacDorman, Declercq, Cabral, & Morton, 2016) and the U.S. infant mortality rate is higher than that of 25 European countries. (MacDorman, M., Mathews, T., Mohangoo, A., & Zeitlin, J., 2014). The dominant biomedical treatment model has historically worked toward decreasing emergent mortality; however, current challenges require broader approaches. Within the literature on severe morbidity and mortality outcomes associated with midwifery care, few primary studies with sufficient numbers for useful conclusions exist. Thus, it was necessary to search systematic reviews for the specific outcomes of mortality, prematurity, and low birth weight.

Maternal outcomes. Maternal mortality data provides no useful information for measuring safety among CNMs. Berg, Callaghan, Syverson, & Henderson (2010) and Creanga et al., (2014) provided statistics on national maternal mortality. Renfrew et al. (2014) included *survival* as an improved outcome with the use of midwives in an integrated and interdisciplinary system. None of these examined maternal mortality rates specifically following CNM care in the US, though. Most probably, this is because the maternal mortality rate is computed per 100,000 live births, With CNMs attending 12% of US births, it would be impossible to show significant mortality differences. In addition, MacDorman et al. (2016) reported that states' slow adoption of measurement tools has prevented the US from tabulating an official maternal mortality rate since 2007. This led to a lesser degree of maternal mortality scrutiny than there is for infant

mortality (MacDorman, Declercq, Cabral, & Morton, 2016). Moreover, Creanga et al.'s (2014) report of the pregnancy-related mortality ratio increase (from 7.2 in 1987 to 17.8 in 2009) noted that 50% of the maternal mortality was the result of other medical conditions in pregnancy. The patients with medical conditions would not qualify for nurse-midwifery care, further affecting the difficulty in evaluating the direct impact of nurse-midwifery care regulation on maternal mortality. Thus, this outcome measure is ineffective for determining safety among CNMs.

Infant outcomes. Beginning with mortality, Levy et al. (2005) found less neonatal mortality with CNM care. These results were similar to the MacDorman & Singh (1998) findings of a CNM neonatal mortality ratio of 0.8 for singleton term births, lower than the physician rate of 1.2. In contrast, the Sutcliffe et al. (2012) and Sandall et al. (2013) systematic reviews found no differences in neonatal mortality rates with midwifery care. The international scope of these systematic reviews may account for the differences, as the primary studies occurred in the U.S. population only. Internationally, midwifery is often the dominant model of care, affecting all care provided. In the US, midwifery is a separate model, with the medical model being dominant. Moreover, comparison of American and European infant mortality (MacDorman, Mathews, Mohangoo, & Zeitlin, 2014) ranked the US 26th of 29 countries. In addition, the US suffered the highest rate of mortality at 37 weeks gestation. This study did not specify provider type; consequently, midwifery's influence could not be isolated.

Although mortality is devastating, prematurity and low birth weight cause an emotional and financial burden for infants, families, and healthcare systems. Thus, these severe infant morbidities were also reviewed. Two studies and a systematic review (Levy, Wilkinson, & Marine, 2005; MacDorman & Singh, 1998; Sandall, Soltani, Gates, Shennan, & Devane, 2013) found less prematurity or low birth weight among infants delivered by CNMs; yet, one

systematic review (Johantgen et al., 2012) stated no differences in low birth weight due to mixed evidence. Some studies found improvement and some did not. The shortcoming of this review is that it did not consider statistical power when evaluating these studies. Lastly, Yang and colleagues (2016) found that women birthing in states in which CNMs practiced autonomously had 13% lower odds of preterm birth and 11% lower odds of delivering a low birth weight baby, compared to women birthing in states with more restrictive midwifery practice

Overall, studies examining pregnancy outcomes have supported the effectiveness of care by CNMs; however, no studies were found that compared pregnancy outcomes in environments where CNMs were autonomous with outcomes in environments where statutes required some form of physician oversight of CNM practice. Legislators and physicians use this gap in the literature to substantiate the need for physician supervision of CNMs, because insufficient research demonstrates the safety of CNM and APRN practice without physician supervision. This review compared CNM practice before and after states dropped restrictive physician supervision legislation.

Method

This retrospective descriptive review was a before and after comparison of pregnancy outcomes among certified nurse-midwives in states that have autonomous midwifery practice statutes. The reviewers compared three years of data from the period when the state had supervisory regulation to three years of data after the state regulation changed to autonomous midwifery practice. Each state was compared against itself for this analysis. The year of the legislative activity was excluded, to ensure that the data measured a full year of practice following the legislation's implementation.

The preliminary step was to determine the current and historical status of nurse-midwifery regulation in each state. The LexisNexis database provided information, in conjunction with the Government Affairs professionals at the American College of Nurse-Midwives. The reviewer validated the statute with state legislative websites. Because birth data before 2003 did not provide an option to identify CNMs as birth attendants, states that achieved *full practice authority* before 2006 were excluded from the population of “full practice authority” states for the purposes of this analysis. In addition, states that obtained full practice authority after 2011 were excluded, as 3 years of “after” data were not obtainable from the CDC Wonder database. This limited the sample population to states that achieved full practice authority, including full prescriptive authority, between 2006 and 2011. Of the five states that met these criteria, some had legislation for full practice authority prior to the time range; however, autonomous prescriptive authority was prohibited until this time.

The investigator obtained aggregated data for this project from the Centers for Disease Control and Prevention through the National Center for Health Statistics public use website, Vital Statistics Online and CDC Wonder. Individual state data on certified nurse-midwifery practice were analyzed including morbidity and mortality outcomes: infant mortality, preterm birth, and low birth weight. Table 2 provides the definitions in use by the CDC for state outcome reporting. Maternal mortality data was insufficient for analysis. Tracked maternal morbidity outcomes were not used as there is currently no method of determining if a CNM or a physician provided the first-line management of the complication. Because the data for this analysis were de-identified, this work did not necessitate human subjects’ protections.

The investigator conducted an historical review of all state legislation regulations of nurse-midwifery practice in conjunction with the ACNM national office between June and

October 2016. Data from the CDC were obtained in October 2016. Analysis was conducted in November 2016.

Results

Further analysis of the database revealed that infant mortality outcomes were unavailable for 2014 at the time of the review. Thus, three states had the full-range of public statistics needed for this review: Colorado, Hawaii, and New York. Colorado and Hawaii nurse-midwives had full practice authority that did not include full prescriptive authority. Both states obtained autonomous prescriptive authority in 2010. New York obtained full practice authority in 2010. These state statistics included nearly 2 million U.S. births and over 200,000 CNM attended births (Table 3). In this sample, the CNM outcomes were significantly better than those of non-CNM providers. Although U.S. CNMs attend low and moderate risk births, which are less likely to sustain poor outcomes, it is noteworthy that no increase in poor outcomes occurred among CNMs after the change in legislation.

Colorado

Total births decreased in Colorado between the “before” years and the “after” years; however, the number and percentage of CNM attended births increased. The 3-year average low birth rate among CNMs was significantly lower post policy change (0.017 vs. 0.014, $p=0.0185$), as was the 3-year average preterm birth rate (0.071 vs. 0.057, $p<.0001$). The infant mortality rate decreased from 2.71 per 1,000 to a number too small for statistical analysis. Table 4 provides a full explanation of the results.

New York

Both total New York births and CNM-attended births decreased during the 2011-2013 time period; however, the percentage of CNM-attended births increased slightly. Low birth weight and premature birth decreased slightly (0.015 to 0.014, $p < .0001$ and 0.07 to 0.063, $p < .0001$) with CNM care. The infant mortality rate following CNM care decreased from 1.9 per 1,000 to 1.83 per 1,000. Non-CNM providers also had decreases in these variables (Table 4).

Hawaii

Hawaii recorded the largest change in CNM-attended births of all 3 states. As in Colorado and New York, the number of births in the state decreased; however, the number of CNM-attended births increased from 5.81% to 9.17% of all births. Individual data on low birth weight, prematurity, and infant mortality had multiple variables that were too small for reliable analysis.

Discussion

This review of over 200,000 CNM-attended births showed a decrease in all the identified morbidity and mortality outcomes among CNMs in Colorado and New York, while Hawaii's numbers were too small for valid calculations. Colorado CNM outcomes for preterm birth and low birth weight significantly decreased. Although preterm birth decreased overall, there was a significantly greater decrease in low birth weight among CNMs than in non-CNM providers. These findings are consistent with the studies of Levy et al., 2005 and MacDorman & Singh, 1998; as well as the systematic reviews of Sandall et al., 2013 and Sutcliffe et al., 2012. In addition, the decrease in infant mortality among CNM-attended births from 2.71 to being so low as to be incalculable is remarkable, especially when comparing it to the state infant mortality rate

of 5.53 for the other providers during the same period (See Table 4). The increase in percentage of births attended by CNMs deserves note as well. This coincides with Yang's findings of a positive association between state policies of autonomous midwifery practice and a larger midwifery workforce and Sekscenski et al.'s (1994) evidence that restrictive scope of practice statutes negatively influence a state's healthcare labor market. Interestingly, this state's midwifery practice was only restricted in prescriptive authority; yet, significant positive changes occurred when there was the removal of a relatively small barrier.

In New York, the largest state reviewed, preterm birth, low birth weight, and infant mortality decreased slightly following CNM care when practice restrictions were removed. As with Colorado, the percentage of births attended by New York CNMs increased after the change in legislation. Although these changes were not as dramatic as in Colorado, the improved outcomes noted among all providers demonstrates the evolution of autonomous providers working together to bridge lapses in caring that reduce safety and quality (Woolf, 2004).

This analysis used national and state quality indicators, identified by type of birth attendant. The outcomes are consistent with previous studies on CNM care (Levy et al., 2005 and MacDorman & Singh, 1998). As mentioned previously, the small number of CNMs in the US may prevent any impact on the overall U.S. infant mortality rates especially when compared to industrialized European nations, such as the United Kingdom and the Netherlands, where midwifery is well-integrated into healthcare systems (MacDorman et al, 2014). The larger percentage of midwifery care may be a factor in better perinatal outcomes for those countries. Midwifery care deserves further exploration as a model to improve all maternal newborn care in the US. This requires a legal system that frees the profession to utilize fully its scope of practice.

One of the compelling features of this review is that it examined CNM care outcomes independent of physician outcomes. Certified nurse-midwives' outcomes were compared against themselves, with equivalent or improved perinatal outcomes found. The specific causes of these outcomes requires further investigation. However, these results demonstrate that the absence of physician supervision does not translate, as some fear, into CNMs practicing outside their appropriate scope of practice. Rather, it challenges the notion that physician supervision is vital for the protection of public health.

The sample included states that met the criteria for obtaining six years of aggregated data: Colorado, Hawaii, and New York. Even though the states were geographically and ethnically diverse, the CNM outcomes were consistent. It was interesting to note that in states where full practice authority and prescriptive authority were two separate regulations, an improvement in outcomes was seen when full prescriptive authority was legislated, even after a significant period of full practice authority. Although no cause and effect relationship exists, improved outcomes support a position that outcomes may be associated with the legislated restrictions.

A limitation of this review is that it did not include all states with full practice authority. Most states that currently have full practice authority obtained it prior to the years when before and after data could be evaluated for CNM outcomes. A few states had restrictions removed for too recently to provide adequate assessment. However, the ability to include two states with sizable number of midwifery practitioners, diverse populations, and large numbers of births provided a sufficient sample for significance. Another limitation was that the outcome indicators did not describe the full gamut of plausible safety measures. This burdens all safety measurement and is not unique to this review. Yet, as cited by Woolf (2004), solutions to

improve access, reduce inequities, and provide the infrastructure for health promotion and chronic disease management could lower morbidity and mortality on a scale unattainable with a focus solely on safety.

Conclusion

There is no evidence to substantiate claims of decreased safety of nurse-midwifery care with removal of practice restrictions. Rather, this study demonstrated either statistically equivalent or improved safety of midwifery care when state statutes permit nurse-midwives to practice according to the full extent of their education. In addition, the percentage of states' midwife-attended births increases after the removal of legislative barriers. It is not the type of restrictive legislation, but the act of restricting a professional's practice (i.e. the ability to use ones' education and skills fully) that denigrates the professional. Legislators need to be fully educated in the benefit of autonomous nurse-midwifery practice to perinatal outcomes and the growth in midwifery practice after the removal of restrictive practice legislation. Professional midwifery autonomy has the potential to ameliorate gaps in access to prenatal care while improving maternal and newborn health outcomes.

References

American College of Nurse-Midwives (ACNM). (2012). *Core competencies for basic midwifery practice*. Retrieved from <http://www.midwife.org>

American College of Nurse-Midwives (ACNM). (2016). *Understanding your practice environment: Making an informed decision about where to work*.

American College of Nurse-Midwives (ACNM), Accreditation Commission for Midwifery Education (ACME), & American Midwifery Certification Board (AMCB). (2011). *Midwifery in the United States and the consensus model for APRN regulation* [White paper]. Retrieved from <http://www.midwife.org>

APRN Joint Dialogue Group. (2008). *Consensus model for advanced practice registered nursing (APRN) regulation: Licensure, accreditation, certification and education*. Retrieved from https://www.ncsbn.org/consensus_model_for_APRN_Regulation_July_2008.pdf:

Berg, C. J., Callaghan, W. M., Syverson, C., & Henderson, Z. (2010). Pregnancy-related mortality in the United States, 1998 to 2005. *Obstetrics and Gynecology*, *116*(6), 1302-1309. doi:10.1097/AOG.0b013e3181fd11

Cragin, L., & Kennedy, H. P. (2006). Linking obstetric and midwifery practice with optimal outcomes. *JOGNN - Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *35*(6), 779-785

Creanga, A. A., Berg, C. J., Ko, J. Y., Farr, S. L., Tong, V. T., Bruce, F. C., & Callaghan, W. M.

(2014). Maternal mortality and morbidity in the United States: Where are we now? *Journal of Women's Health*, 23(1), 3-9. doi:10.1089/jwh.2013.4617

Declercq, E. R. (2012). Trends in midwife-attended births in the United States, 1989—2009.

Journal of Midwifery and Women's Health, 57(4), 321-326.

Declercq, E. R., Paine, L. L., Simmers, D. R. & DeJoseph, J. F. (1998). State regulation, payment

policies, and nurse-midwife services. *Health Affairs (Millwood)*, 17(2), 190-200.

Drife, J. (2001). Quality measures for the emergency obstetrics and gynaecology services.

Journal of the Royal Society of Medicine, 94(Suppl 39), 16-19

Frank, J. R., Mungroo, R., Ahmad, Y., Wang, M., DeRossi, S., & Horsley, T. (2010). Toward a

definition of competency-based education in medicine: A systematic review of published definitions. *Medical Teacher*, 32(8), 631-637.

Fraser, W., Hatem-Asmar, M., Krauss, I., Maillard, F., Breart, G., & Blais, R. (2000).

Comparison of midwifery care to medical care in hospitals in the Quebec pilot projects study: Clinical indicators. *Canadian Journal of Public Health*, 91(1), 5-11

Gardner, D. (2010). Health policy and politics. Expanding scope of practice: Inter-professional

collaboration or conflict? *Nursing Economic\$,* 28(4), 264-266

Grobman, W. A., Feinglass, J., & Murthy, S. (2006). Are the agency for healthcare research and

quality obstetric trauma indicators valid measures of hospital safety? *American Journal of Obstetrics & Gynecology*, 195(3), 868-874

Hartley, H. (1999). The influence of managed care on supply of certified nurse-midwives: An evaluation of the physician dominance thesis. *Journal of Health and Social Behavior*, 40(1), 87-101

Hastings-Tolsma, M., Camune, B., Wilcox, S. L., Burpo, R., Brucker, M. Nodine, P., Griggs, J. & Callahan, T.J. (2017). 2016 Survey of Texas certified nurse-midwives: Nature and scope of practice. Manuscript in preparation.

Horton, R., & Astudillo, O. (2014). The power of midwifery. *Lancet*, 384(9948), 1075-1076.
doi:10.1016/S0140-6736(14)60855-2 [doi]

Johantgen, M., Fountain, L., Zangaro, G., Newhouse, R. P., Stanik-Hutt, J., & White, K. (2012). Comparison of labor and delivery care provided by certified nurse-midwives and physicians: A systematic review, 1990 to 2008. *Women's Health Issues*, 22(1), e73; e73-e81; e81

Kinzelman, C., & Bushman, J. (2015). Understanding state practice environments. Retrieved August 28, 2015, from [www.midwife.org/Understanding-State-PracticeEnvironments/StateEnvironmen ts5-11-15v3.pdf](http://www.midwife.org/Understanding-State-PracticeEnvironments/StateEnvironmen%20ts5-11-15v3.pdf)

Knudtson, M. D. (2004). *The relationship between reported malpractice cases for nurse practitioners and the type of supervision mandated by state law* (D.N.Sc.). Available from ProQuest Dissertations & Theses Full Text: Health & Medicine. (305078200). Retrieved from <http://search.proquest.com/docview/305078200?accountid=15172>

Laurant, M., Reeves, D., Hermens, R., Braspenning, J., Grol, R., & Sibbald, B. (2005).

Substitution of doctors by nurses in primary care. *Cochrane Database of Systematic Reviews*, (2), 001271.

LeBuhn, R., & Swankin, D.A. (2010) *Reforming scopes of practice: A white paper* [white paper].

Retrieved from citizen advocacy center website: <http://www.cacenter.org>

Levy, B. S., Wilkinson, F. S., & Marine, W. M. (2005). Reducing neonatal mortality rate with nurse-midwives. *Journal of Midwifery & Women's Health*, 50(2), e10-8.

MacDorman, M. F., Declercq, E., Cabral, H., and Morton, C. (2016). Recent increases in the U.S. maternal mortality rate: Disentangling trends from measurement issues.

Obstetrics & Gynecology, 128(3), 447-455. Doi: 10.1097/AOG.0000000000001556

MacDorman, M., Mathews, T., Mohangoo, A., & Zeitlin, J. (2014). *International comparisons of infant mortality and related factors: United States and Europe, 2010*. (National Vital Statistics Reports, 63-5). Retrieved from

http://www.cdc.gov/nchs/data/nvsr/nvsr63/NVSR63_05.pdf

MacDorman, M. F., & Singh, G. K. (1998). Midwifery care, social and medical risk factors, and birth outcomes in the USA. *Journal of Epidemiology and Community Health*, 52(5), 310-317

O'Brien, B., Chalmers, B., Fell, D., Heaman, M., Darling, E. K., & Herbert, P. (2011). The experience of pregnancy and birth with midwives: Results from the Canadian maternity experiences survey. *Birth*, 38(3), 207-215.

doi:<http://dx.doi.org/10.1111/j.1523536X.2011.00482.x>

- Poulton, B. (2004). Does professional regulation for nursing protect patients or is it simply a way of gaining professional status? *Quality in Primary Care, 12*, 177-8.
- Reagan, P. B., & Salsberry, P. J. (2013). The effects of state-level scope-of-practice regulations on the number and growth of nurse practitioners. *Nursing Outlook, 61*(6), 392-399
- Renfrew, M. J., McFadden, A., Bastos, M. H., Campbell, J., Channon, A. A., Cheung, N. F., Declercq, E. (2014). Midwifery and quality care: Findings from a new evidence-informed framework for maternal and newborn care. *The Lancet: Midwifery, 9-25*.
doi:10.1016/S0140-6736(14)60789-3 [doi]
- Robert Wood Johnson Foundation. (2011). *Initiative of the future of nursing: IOM recommendations*. Retrieved from <http://www.thefutureofnursing.org/recommendations>
- Rooks, J. P. (1999). The midwifery model of care. *Journal of Nurse-Midwifery, 44*(4), 370-374.
- Sandall, J., Soltani, H., Gates, S., Shennan, A., & Devane, D. (2013). Midwife-led continuity models versus other models of care for childbearing women. *Cochrane Database of Systematic Reviews, 8*, 004667. doi:<http://dx.doi.org/10.1002/14651858.CD004667.pub3>
- Schimmel, L. M., Lee, K. A., Benner, P. E., & Schimmel, L. D. (1994). A comparison of outcomes between joint and physician-only obstetric practices. *Birth, 21*(4), 197-205
- Sekscenski, E. S., Sansom, S., Bazell, C., Salmon, M. E., & Mullan, F. (1994). State practice environments and the supply of physician assistants, nurse practitioners, and certified nurse-midwives. *New England Journal of Medicine, 331*(19), 1266-1271

Sonenberg, A. (2010). Medicaid and state regulation of nurse-midwives: The challenge of data retrieval. *Policy, Politics, and Nursing Practice*, 11(4), 253-259.

doi:10.1177/1527154411398137

Sutcliffe, K., Caird, J., Kavanagh, J., Rees, R., Oliver, K., Dickson, K., Thomas, J. (2012).

Comparing midwife-led and doctor-led maternity care: A systematic review of reviews.

Journal of Advanced Nursing, 68(11), 2376-2386. doi:10.1111/j.1365-2648.2012.05998.x

ten Hoope-Bender, P., de Bernis, L., Campbell, J., Downe, S., Fauveau, V., Fogstad, H., . . . Van

Lerberghe, W. (2014). Improvement of maternal and newborn health through midwifery.

The Lancet: Midwifery, 49-58. doi:10.1016/S0140-6736(14)60930-2

United States Department of Health and Human Services (US DHHS), Centers for Disease

Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of

Vital Statistics (2016). *Natality public-use data 2007-2014, CDC WONDER Online*

Database. Retrieved from <http://wonder.cdc.gov/natality.html>

United States Department of Health and Human Services (US DHHS), Centers for Disease

Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of

Vital Statistics (2016). *Linked birth/infant death records, 2007-2013, CDC WONDER*

Online Database. Retrieved from <http://wonder.cdc.gov/lbd-current.html>

Woolf, S. H. (2004). Patient safety is not enough: Targeting quality improvements to optimize

the health of the population. *Annals of Internal Medicine*, 140(1), 33-36. doi:140/1/33 [pii]

Yang, Y. T., Attanasio, L. B., & Kozhimannil, K. B. (2016). State scope of practice laws, nurse-midwifery workforce, and childbirth procedures and outcomes. *Women's Health Issues, xxxxx*, 1-6. <http://dx.doi.org/10.1016/j.whi.2016.02.003>

Figure 1 2016 State Practice Regulatory Status for Certified Nurse-Midwives

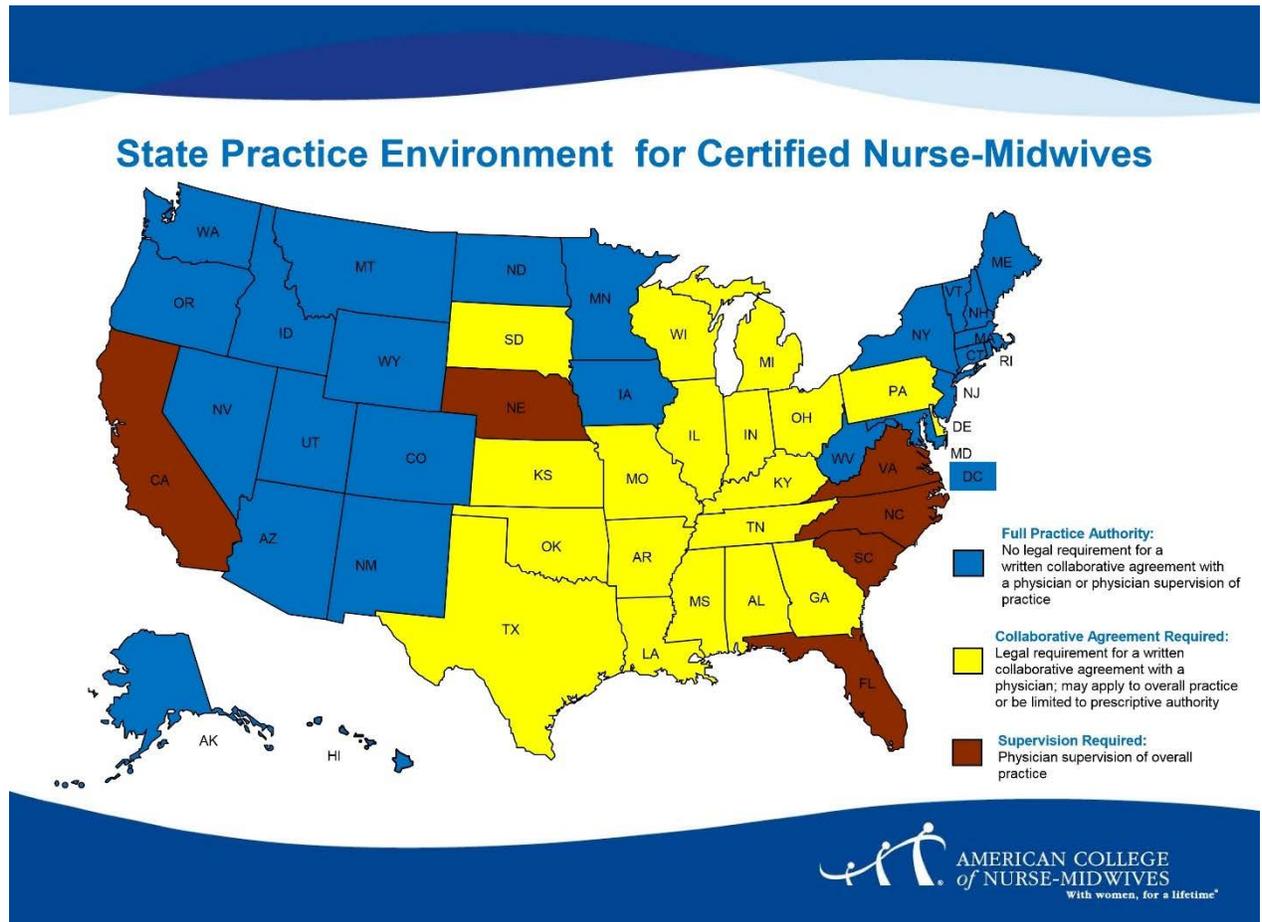


Figure 1. Slide from “Understanding your practice environment: Making an informed decision about where to work”. American College of Nurse-Midwives, 2016.

Table 1

Comparison of Midwifery and Medical Models of Care

	Midwifery	Medicine
Expertise	Normalcy	Pathology
Goals	Health, safety, woman's development and adaptation to motherhood	Health & safety
Provider's role in the relationship with the woman	Active partner	Key decision-maker
Overall management focus	Supporting and enhancing normal physiology	Pathologic potential; Diagnosis and treatment of complications/disease
Prenatal care focus	Education, support	Pathologic screening and testing
Labor and birth focus	Presence, hands-on assistance, timeintensive	Substitution of medical technology for professional time

Rooks, J. P. (1999). The midwifery model of care. *Journal of Nurse-Midwifery*, 44(4), 370-374.

Table 2*CDC Outcome Definitions*

OUTCOME	DEFINITION
INFANT MORTALITY RATE	The death of a baby before his or her first birthday.*
PRETERM BIRTH RATE	The birth of an infant before 37 weeks of pregnancy*
LOW BIRTH WEIGHT RATE	Weight less than 2500 grams at time of birth*

Note: *Rates are calculated on the number of occurrences per 1,000 births. Adapted from the United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics (2016). *Natality public-use data 2007-2014, CDC WONDER Online Database and Linked birth/infant death records, 2007-2013, CDC WONDER Online Database.*

Table 3*Birth Numbers Before and After State Scope of Practice Legislative Action*

Restriction Period 2007-2009			
STATE	TOTAL BIRTHS	CNM-ATTENDED BIRTHS	% BIRTHS ATTENDED BY CNM
Colorado	209,459	21,401	10.22
Hawaii	57,505	3,339	5.81
New York	751,944	74,930	9.96
Total	1,018,908	99,670	9.78
Full Practice Period 2011-2013			
Colorado	195,249	23,705	12.14
Hawaii	56,923	5,219	9.17
New York	719,208	72,512	10.08
Total	971,380	101,436	10.44

Note: Adapted from the United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics, Natality public-use data 2007-2014, on CDC WONDER Online Database, February 2016. Accessed at <http://wonder.cdc.gov/natality-current.html> on January 2, 2017.

Table 4

Outcomes of Care Before and After State Scope of Practice Legislative Action

Colorado						
Low Birth Weight						
		Normal BW	LBW	LBW%	<i>p</i>	
2007-2009	Non-CNM	179564	8503	0.045213	p<.0001	
	CNM	21037	364	0.017009		
2011-2013	Non-CNM	164011	7533	0.043913	p<.0001	p=0.0603 (post vs Pre)
	CNM	23368	337	0.014216		p=0.0185 (post vs pre)
Prematurity						
		Normal	Preterm	Prematurity%	<i>p</i>	
2007-2009	Non-CNM	166552	21515	0.114401	p<.0001	
	CNM	19883	1518	0.070931		
2011-2013	Non-CNM	153796	17748	0.10346	p<.0001	p<0.0001 (post vs Pre)
	CNM	22354	1351	0.056992		p<0.0001 (post vs Pre)
Infant Mortality						
		Infant Deaths	Death Rate per 1,000			
2007-2009	Non-CNM	1,239	6.59			
	CNM	58	2.71			
2011-2013	Non-CNM	949	5.53			
	CNM	30	Suppressed*			
New York						
Low Birth Weight						

EXPLORATORY DESCRIPTIVE REVIEW OF CERTIFIED NURSE-MIDWIFERY

		Normal BW	LBW	LBW%	<i>p</i>	
2007-2009	Non-CNM	648558	28456	0.042032	p<.0001	
	CNM	73825	1105	0.014747		
2011-2013	Non-CNM	620529	26167	0.040463	p<.0001	p<0.0001 (post vs Pre)
	CNM	71503	1009	0.013915		p=0.1869(post vs Pre)
Prematurity						
		Normal	Preterm	Prematurity%	<i>p</i>	
2007-2009	Non-CNM	596309	80705	0.119207	p<.0001	
	CNM	69702	5228	0.069772		
2011-2013	Non-CNM	578756	67940	0.105057	p<.0001	p<0.0001 (post vs Pre)
	CNM	67975	4537	0.062569		p<0.0001 (post vs Pre)
Infant Mortality						
		Infant Deaths	Death Rate per 1,000			
2007-2009	Non-CNM	3,979	5.88			
	CNM	142	1.9			
2011-2013	Non-CNM	3,479	5.38			
	CNM	133	1.83			

Note: *Suppressed data did not meet the standard for precision and validity. Adapted from United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics, Natality public-use data 2007-2014 and Linked Birth/Infant Death Records 2007-2013 on CDC WONDER Online Database, February 2016. Accessed at <http://wonder.cdc.gov> on October 22, 2017.

