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Final DNP Practice Inquiry Project Report

The Effect of Nurse Dose on Breastfeeding Exclusivity – A Patient Level Analysis

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University of Kentucky

College of Nursing

Spring 2016

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Dedication

This body of work is dedicated to my mother, Verna Lou Allgeier. She provided the guidance for my educational path, and she taught me about the privilege of caring for others.

Acknowledgements

I would like to take this opportunity to thank those who supported me during this journey and who provided the expertise that assisted in completion of this work.

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Capstone Overview

In 2010, The Association of Women's Health Obstetrical and Neonatal Nurses (AWHONN) released its *Guidelines for Professional Registered Nurse Staffing for Perinatal Units* (AWHONN, 2010). Acknowledging that patient care in obstetrics has become increasingly complex due to an increasing number of pregnant women with co-morbidities such as diabetes, obesity, cardiac disease and drug addiction, these new guidelines expressly called for an increase in nurse staffing related to the intensifying complications of care (Wilson & Blegen, 2010). However, the supporting evidence used to justify the addition of registered nurse hours was generalized data from studies of increased staffing in acute care and intensive care settings. Additionally, the nurse sensitive outcome measures used in the supporting studies were *inpatient mortality* and *failure-to-rescue*, both of which are difficult to benchmark to translate into a perinatal setting. Currently, there is little published evidence evaluating nurse-sensitive care in obstetrics, or any nurse sensitive measures clearly defined for perinatal care (Wilson & Blegen, 2010).

During the years immediately following the AWHONN 2010 recommendations, three things occurred that formed my practice inquiry project. First, the Surgeon General's *Call to Action* (2011) highlighted breastfeeding as the most effective measure a mother can take to protect her health and the health of her infant. In this report, the Surgeon General also noted that the practice of health care providers influenced breastfeeding success. Second, The Joint Commission in 2012 released a perinatal core measure set mandating the reporting of breastfeeding exclusivity at the time of discharge from the hospital for all healthy term neonates. Third, in 2013, AWHONN published a

set of 14 draft nurse sensitive measures for women's health and perinatal nursing. Among this list, "skin-to-skin contact immediately after birth" and "breastfeeding exclusivity at discharge" were designated as nurse sensitive perinatal outcomes. It was within the confluence of these complimentary reports and guidelines that the intention of my work took shape. The focus of my capstone then sharpened into an evaluation of the relationship between nurse characteristics and the process measure of skin-to-skin contact immediately after delivery and the outcome measure of breastfeeding exclusivity at discharge.

My first manuscript, *The Effect of Nurse Dose on Patient Outcomes: An Integrative Literature Review*, was to examine and synthesize the current literature on nurse staffing and nurse characteristics that may influence nurse sensitive care. My second manuscript and practice inquiry project, *The Effect of Nurse Dose on Breastfeeding Exclusivity – A Patient Level Analysis*, evaluated the relationship between the attributes of *nurse dose* and the immediacy and duration of skin-to-skin contact at delivery and breastfeeding exclusivity at discharge. My third manuscript, *Affordable Care Act of 2010, Section 4207: Reasonable Break Time for Nursing Mothers*, was included to illustrate the influence of policies at the federal and/or state level on health decisions.

Manuscript 1

The Effect of Nurse Dose on Patient Outcomes: An Integrative Literature Review

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Abstract

Nurse staffing ratios and their effect on patient outcomes have been studied for well over a decade. Recently, additional research has been focused on the clinical impact of other characteristics such as nurse education and specialty certification on patient outcomes such as mortality, failure-to-rescue and other adverse events. Little of this literature has focused on nurse sensitive care and outcomes of childbearing patients. The aim of this paper is to review and summarize the recent literature on nurse staffing, nurse education, specialty certification and the composite variable of *nurse dose* on patient outcomes with a special interest in the perinatal setting. Identification of gaps in the existing body of knowledge will be reviewed, along with recommendations for potential inquiry in future work. A search of the CINAHL database was conducted from 2010 – 2015. Publications included were mostly retrospective cross-sectional designs. The articles were categorized by author, study design, sample, and findings. Nurse staffing and nurse education were identified as the strongest predictors of prevention of adverse outcomes but additional research is needed to examine the concept of *nurse dose* and its effect on patient outcomes in the perinatal setting.

Keywords: *nurse staffing, nurse educational level, nurse dose, specialty certification and patient outcome, perinatal*

The Effect of Nurse Dose on Patient Outcomes: An Integrative Literature Review

In 2010, the Association of Women's Health Obstetrical and Neonatal Nurses (AWHONN) released its *Guidelines for Professional Registered Nurse Staffing for Perinatal Units* (Association of Women's Health Obstetric and Neonatal Nurses, 2010). These new guidelines expressly called for an increase in nurse staffing related to the increasing complexity of care required by obstetrical patients over the past twenty years. However, the supporting evidence used to justify these increases in staffing ratios was generalized data from studies of increased staffing in medical-surgical and intensive care units as opposed to obstetrical and neonatal settings. As nursing labor makes up one of the largest expenditures of the health care system, and with the advent of the current culture of value-based care, nurse leaders must evaluate the structure of nursing care including staffing supply, skill level and the education/certification of nursing (Welton & Harper, 2015). Staffing level alone may not be the most effective predictor of patient outcomes. Instead, nurse characteristics, or a combination of both nurse characteristics and staffing ratios may prove to be a better indicator of efficient, quality care. Accordingly, the purpose of this integrative review is to explore and summarize the current literature on the effect of nursing staff levels on patient outcomes, including the preparation and experience of nurses, with particular attention to the effect of nurse characteristics on perinatal outcomes.

Background

For more than a decade researchers have investigated the effect of nurse staffing on patient outcomes. Their inquiries have focused on nurse staffing levels and skill mix within medical-surgical and intensive care units and their effect on specific patient

outcomes such as inpatient mortality, failure-to-rescue, patient falls, and medication errors (Aiken, Sloane, Cimiotti, et al., 2010; Aiken, Cimiotti, et al., 2011; Park, Blegen, Spetz, Chapman, & De Groot, 2012; Frith et al., 2010; Lake, Shang, Klaus, Dunton, 2010; Cho et al., 2014; Carthon, Kutney-Lee, Jarrin, Sloane & Aiken, 2012; West et al., 2013; Tzeng, Hu, & Yin, 2011; Needleman et al., 2011). These particular patient outcomes were chosen because they were seen as variables potentially sensitive to nursing care (Van den Heede, Clarke, Sermeus, Vleugels & Aiken, 2007). Notably, only very limited information has been published on the relationship between nurse staffing and perinatal patient outcomes (Clark, Saade, Meyers, Frye & Perlin, 2013; Wilson & Blegen, 2010).

While the aforementioned body of evidence continues to grow, additional research has focused on the association between nursing education, specialty certifications and experience in relation to patient outcomes such as inpatient mortality, failure-to-rescue, hospital acquired decubitus ulcers and falls (Kutney-Lee, Sloane & Aiken, 2013; Blegen, Goode, Park, Vaughn, & Spetz, 2013; Kendall-Gallagher, Aiken, Sloan & Cimiotti, 2011; Yakusheva, Lindrooth, & Weiss, 2014). A seminal study by Aiken et al (2003) found that “both lower patient-to-nurse ratios and having a majority of registered nurses educated at the baccalaureate level appear to be jointly associated with substantially lower mortality and failure-to-rescue rates” (p. 1622). Again, despite advancing knowledge regarding nurse staffing and the preparation of those nurses, evidence continues to be limited regarding an association or relationship between nursing care and nurse-sensitive perinatal outcomes.

During this past decade researchers have striven to develop a construct that will clearly capture and specify the entirety of nursing care contained within various staffing variables that influence patient outcomes. Manojlovich and Sidani (2008) built upon this initial work by clarifying and validating the concept of *nurse dose* first introduced by Brooten and Youngblut (2006). They undertook a concept analysis and derivation process creating a conceptual and operational definition of *nurse dose* (Manojlovich & Sadani, 2008; Sidani, Manojlovich & Covell, 2010). The concept of *nurse dose* was refined into a structural variable consisting of two attributes, *active ingredient* (education, experience, skill mix) and *intensity* (FTEs, nurse:patient ratio, RN-HPPD) (Sidani, Manojlovich & Covell, 2010). Their concept of *nurse dose* facilitates further research that evaluates more than one staffing variable, demonstrating the effect of nursing care as a whole on patient outcomes and adverse events (Manojlovich, Sidani, Covell & Antonakos, 2011).

Methods

A search of the current literature (2010-2015) was conducted using the CINAHL database. Key terms used in the search were *nurse staffing*, *nurse educational level*, *nurse dose*, *specialty certification* and *patient outcome*. The search retrieved 637 records. The titles and abstracts were screened. Of the total, 606 papers were excluded due to duplication or not meeting the goal of the review. Only primary research studies were included which resulted in the deletion of ten more publications. After careful review of the remaining papers' reference lists, seven articles were added to the final evaluation. A full-text review of 28 publications was completed, with only one study found that related

nurse staffing and perinatal outcomes. Consequently, studies from medical-surgical areas as well as intensive care units were included in the review.

Data Analysis and Synthesis

The data analysis method employed was that described and outlined by Whittemore and Knafl (2005). Publications were first grouped to allow for a logical and manageable structure to compare results. An evidence table was created to organize the data for display and easy comparison of the variables (Appendix). After reviewing and comparing the results, four themes emerged: (a) nurse staffing levels and the effect on patient outcomes, (b) nurse educational level and the effect on patient outcomes, (c) nurse specialty certification and the effect on patient outcomes and (d) nurse dose and the effect on patient outcomes.

Findings

Nurse Staffing Levels and the Effect on Patient Outcomes

Nurses have for decades cited nurse staffing ratios as a concern in relation to quality of care (Aiken et al., 2010). An enhanced focus on quality outcomes has promoted more research and published literature on nurse staffing and its effect on patient outcomes. Aiken et al. (2010) compared California hospitals two years after the implementation of mandated staffing guidelines with other states without such mandates. They discovered that the effect of adding one patient to a nurse's workload significantly increased inpatient mortality and failure-to-rescue. This increase in inpatient mortality related to nurse workload has been replicated in other studies in the United States and Europe (Cho et al., 2014; Carthon et al., 2012; Needleman et al., 2011). When specifically evaluating nurse staffing on intensive care units, two recent studies found

that higher nurse staffing was associated with higher survival rates (Diya, Van den Heede, Sermeus & Lesaffre, 2011; West et al., 2014). Specifically, Diya et al. (2011) found that in hospitals with a large volume of cardiac procedures there was a stronger negative association between staffing levels and in-hospital mortality. Additionally, they also noted that on postoperative general nursing units there was a significant negative relationship between nurse staffing levels and readmission to the ICU or operating theater for patients with a low severity of illness (Diya et al., 2011). Note that high patient turnover significantly impacts resource utilization and contributes to increased work demands on nursing. Thus, when adding patient turnover as a variable, the beneficial effect of nurse staffing on failure-to-rescue decreased by as much as 11.5 %. This finding strongly suggests that nurse staffing must be adjusted to meet the demands of high turnover if failure-to-rescue issues are to be consistently addressed (Park et al., 2012).

The association between nurse staffing and patient falls is less consistent. Two studies noted that as registered nurse hours per patient day increased, along with a registered nurse skill mix increase, patient falls decreased (Frith et al., 2010; Patrician, Loan, McCarthy & Fridman, 2011). However, Lake et al. (2010) found that registered nurse staffing had only a small effect on patient falls, but that Magnet status of the hospital had a significant salutary effect on patient falls regardless of staffing. Another approach investigating patient falls examined staffing levels in regard to three inpatient satisfaction measures (responsiveness of staff, cleanliness, and quietness of the hospital) that may contribute to patient falls (Tzeng, Hu & Yin, 2011). Tzeng, Hu & Yin (2011) found a hospital may have lower injurious fall rate if the hospital had higher inpatient

satisfaction measures on the question related to “quietness of the hospital environment” (Tzeng, Hu & Yin, 2011). Additionally, an increase in nursing personnel and in registered nurse staff was associated with an increase in injurious fall rates (Tzeng, Hu & Yin, 2011). Although these results contradict other studies, they contribute to the discussion regarding fall prevention and possible strategies that may be effective beyond the addition of human resources (Tzeng, Hu & Yin, 2011). With hospitals again approaching a time of nursing shortages, another variable to consider in nurse staffing is the effect of nursing turnover and the use of temporary nurse staffing. Bae, Kelly, Brewer and Spencer (2014) analyzed nurse staffing from 35 nursing units in three hospitals in relation to patient falls and unit acquired pressure ulcers (UAPU). Patient falls and injury falls were greater in units with higher temporary registered nurse staffing but decreased with higher levels of licensed practical nursing hours per patient day (Bae et al., 2014). It was noted that the temporary staff were not a substantial mix of the total hours per patient day in any unit; therefore, while important information to consider, managers and administrators might plan additional orientation or training when using temporary staff during times of high turnover (Bae et al., 2014).

The effect of nurse staffing on other adverse events, such as unit acquired pressure ulcers has also been investigated. Choi and Staggs (2014) recently evaluated six different staffing measures including both administrative measures (RN skill mix and three versions of nursing hours per patient day) and nurse-reported measures (RN-reported number of assigned patients and RN-perceived staffing adequacy) in relation to UAPU. Of all six staffing variables, only “RN-perceived staffing adequacy” significantly correlated with the occurrence of UAPU (Choi & Staggs, 2014). Mark and

Harless (2010) evaluated the relationship between nurse staffing and six post-surgical complications using the *present on admission* indicator. Their results found no significant relationship between RN staffing and any of the complications studied (Mark & Harless, 2010). On the contrary, they found an opposite trend. As RN staffing increased, there was an increase in complications (Mark & Harless, 2010). One possibility for this finding could be increased staffing allows for improved identification and documentation of complications (Mark & Harless, 2010).

Only the work of Clark et al. (2013) examined the relationship between staffing and perinatal outcomes. Clark et al. (2013) completed a retrospective analysis of patient outcomes when the patient was provided with a one-to-one nurse patient ratio while receiving oxytocin during labor. Primary cesarean section rates and rates of multiple complications increased significantly when one-to-one staffing was provided at an increased frequency (Clark et al., 2013). However, there was no evidence of a significant association between one-to-one nurse staffing ratios and birth asphyxia (Clark et al., 2013). Overall, they found similar patient outcomes at facilities that provided one-to-one staffing less than 25 % of the time and those that staffed in this manner greater than 75 % of the time. Clark and colleagues (2013) note that a variety of obstetrical patients receive oxytocin in labor, recommending that such intense staffing should be dictated by patient acuity not by the administration of oxytocin. Ivory and Wade (2014) noted methodological flaws in both the data collection and the data analysis of the Clark et al (2013) study. First, one-to-one staffing was determined by the opinion of nurse leaders in each organization instead of chart reviews or financial data (Ivory & Wade, 2014). Additionally, the patient outcomes included in the analysis were of all patients and not

just those who received oxytocin in labor. Finally, a power analysis was not completed to determine the number of patients needed to detect a statistically significant difference (Ivory & Wade, 2014).

Nurse Education and Patient Outcomes

Since Aiken's seminal study in 2003 there has been steadily growing interest in the impact of nursing education on patient outcomes, but findings are still equivocal (Blegen et al., 2013). Pennsylvania *nurse survey* and *patient discharge* data from 1999 and 2006 were used to examine if changes in the percentage of baccalaureate prepared nurses in a hospital unit would, over time, change rates of surgical patient mortality and failure-to-rescue (Kutney-Lee, Sloane & Aiken, 2013). One hundred and thirty four acute care hospitals were included in the study. On average, there was no difference in the percent of baccalaureate prepared nurses across hospitals, but some hospitals had significant increases in BSN prepared nurses while others had significantly fewer (Kutney-Lee, Sloane & Aiken, 2013). The average years of RN experience increased significantly from 14.5 to 17.9, and the nurse-reported skill mix declined over the same time period (Kutney-Lee, Sloane & Aiken, 2013). The study revealed an increase in the percentage of nurses with baccalaureate degrees within a hospital was associated with significant reductions in surgical mortality and failure-to-rescue (Kutney-Lee, Sloane & Aiken, 2013). Specifically, a ten-point increase in a hospital's percentage of baccalaureate prepared nurses was associated with an average reduction of 2.12 deaths for every 1,000 patients (Kutney-Lee, Sloane & Aiken, 2013). Notably, there were no significant reductions in mortality or failure-to-rescue related to changes in nurse-

reported staffing levels, skill mix, or years of experience (Kutney-Lee, Sloane & Aiken, 2013).

Blegen, Goode, Park, Vaughn and Spetz (2013) examined the effects of baccalaureate education on other nurse-sensitive outcomes while controlling for hospital characteristics such as case-mix index, nurse staffing, and hospital type. Hospitals with higher proportions of baccalaureate prepared nurses were found to have lower rates of congestive heart failure related mortality, failure-to-rescue, hospital acquired pressure ulcers, post-operative deep vein thrombosis, and pulmonary embolism (Blegen et al., 2013). In addition to a reduction in adverse patient events, shorter lengths of stay were observed. The only nurse-sensitive indicator without a significant association was hospital acquired infection. Although the correlation was negative, it was not statistically significant (Blegen et al., 2013).

Researchers have combined variables to evaluate the impact of both a baccalaureate-educated workforce and specialty certifications on patient outcomes (Kendall-Gallagher, Aiken, Sloane & Cimiotti, 2011). Once again, a significant decrease in inpatient 30-day mortality and failure-to-rescue was associated with a higher proportion of baccalaureate prepared nurses. Additionally, there was a separate and significant association with lower mortality and failure-to-rescue when the nurses were baccalaureate prepared and held a specialty certification (Kendall-Gallagher et al., 2011). Aiken et al (2011) evaluated the association between staffing, education and the work environment on mortality and failure-to-rescue for general, orthopedic and vascular surgery patients at 665 hospitals in four large states. Although all of these variables had been studied independently or in various combinations, Aiken et al (2011) evaluated their

impact concomitantly. As seen in previous studies, a ten percent increase in Bachelor of Science in Nursing degree nurses (BSN) decreased the odds of inpatient mortality and failure-to-rescue by four percent regardless of work environment (Aiken et al., 2011). Remarkably, decreasing the workload of nurses by one patient per nurse did not change the odds of death or failure-to-rescue if the work environment was poor, but in hospitals with the best work environments inpatient mortality was reduced by nine percent and failure to rescue by ten percent when nursing work load was reduced by one patient (Aiken et al., 2011).

The United States is not alone in their concern regarding healthcare expenditures and the quality and safety of care (Aiken, Sloane, Bruyneel, et al., 2014). The European Commission funded RN4CAST to provide scientific evidence for decision making and guidance relevant to their nursing workforce (Aiken, Sloane, Bruyneel, et al., 2014). Aiken, Sloane, Bruyneel, et al., (2014) evaluated differences in patient-to-nurse workloads and educational qualifications in association with mortality after common surgical procedures in nine European countries. An increase of one patient in a nurse's assignment was associated with a seven percent increase in the likelihood of an inpatient dying within 30 days of admission. However, every ten percent increase in BSN prepared nurses was associated with a decrease in the likelihood of death by seven percent (Aiken, Sloane, Bruyneel, et al., 2014).

All but one of the studies reviewed used a cross-sectional or correlational design at the hospital or unit level. The one exception was a study investigating the effect of nurses with a BSN at the patient level (Yakusheva, Lindrooth & Weiss, 2014).

Yakusheva, Lindrooth and Weiss (2014) evaluated the proportion of care received from a

BSN-educated nurse on mortality, readmission, length of stay and inpatient costs (Yakusheva, Linrooth & Weiss, 2014). Individual patients were matched with the nurses who provided care for them based on nursing assessments documented in the electronic health record. The unique electronic identifier of each nurse was linked to their level of education to calculate the dose of BSN-level care (Yakusheva, Linrooth & Weiss, 2014). Proportion of BSN-care was measured as a continuous variable and as a categorical variable (greater than 80% of care). When evaluated as a continuous variable, a ten percent increase in the BSN dose was associated with a 10.9% decrease in in-patient mortality (Yakusheva, Linrooth & Weiss, 2014). In the analysis of the categorical variable, there was an 18.7% decrease in the odds of readmission and a 1.9% reduction in length of stay if the patient received at least 80% of their care by BSN prepared nurses (Yakusheva, Linrooth & Weiss, 2014).

Nurse Specialty Certification and Patient Outcomes

Specialty nurse certifications are voluntary credentials for which nurses may qualify and sit for exams when they have obtained a certain level of experience and knowledge in their specialty area. Once certified in a specialty area, the nurse must continue to advance her/his professional knowledge and development in that area in order to maintain the certification. Magnet designated hospitals usually have a higher percentage of nurses with specialty certifications as well as higher levels of education due to the professional engagement of the staff. McHugh and colleagues (2013) compared risk-adjusted mortality and episodes of failure-to-rescue in Magnet hospitals and non-Magnet hospitals. They found that Magnet hospitals had significantly more BSN prepared nurses, higher proportions of nurses with specialty certifications, and better

work environments (McHugh et al., 2013). Additionally, patients in Magnet hospitals had a 14% lower chance of mortality and 12% less likelihood of failure-to-rescue while controlling for nursing and hospital characteristics (McHugh, et al., 2013). Thus, while higher education, specialty certifications and better work environments are associated with better outcomes, there appeared to be a larger effect of Magnet designation that could not be completely explained by the organizational characteristics (McHugh et al., 2013).

Additional studies evaluated the proportion of specialty certified nurses in relation to adverse outcomes such as falls, injurious falls and pressure ulcers. Boltz, Capezuti, Wagner, Rosenberg and Secic (2013) assessed the relationship between nurse certification and nursing-sensitive outcomes that primarily serve older adults. An inverse relationship was noted between the proportion of nurses with a specialty certification and the unit fall rate. However, no relationship was demonstrated with injurious falls, UAPU or use of restraints (Boltz et al., 2013). Boyle, Cramer, Potter and Staggs (2015) evaluated patient falls in relation to nursing specialty certifications over time and found a small, statistically significant inverse relationship as well.

Boyle, Cramer, Potter, Gatua and Stobinski (2014) explored the relationship between specialty-certified nurses providing direct care in perioperative units, surgical intensive care units and surgical units, and the occurrence of central-line associated bloodstream infections, catheter-associated urinary tract infections, and hospital-acquired pressure ulcers. Significantly lower rates of central-line associated bloodstream infections in surgical intensive care units were associated with higher rates of care delivered by certified post-anesthesia nurses (CPAN) and certified nurse operating

room/certified RN first assistants (CNOR/CRNFA) (Boyle et al., 2014). However, in this same study, higher rates of CNOR/CRNFAs were also associated with higher rates of hospital acquired pressure ulcers. Without further evaluation it is unclear if this association was related to this particular patient population being at higher risk for pressure ulcers or significantly linked to nursing factors in some other way (Boyle et al., 2014).

Krapohl, Manojlovich, Redman and Zang (2010) evaluated the association between the proportion of certified nurses in intensive care units with three outcomes: (a) rate of central line catheter associated blood stream infections, (b) rate of ventilator-associated pneumonia, and (c) prevalence of pressure ulcers. In addition, Krapohl et al. (2010) examined the relationship between nurses' perceptions of workplace empowerment (measured by the questionnaire Conditions for Work Effectiveness Questionnaire-II) and the three clinical outcome measures. There were no significant relationships found between the proportion of certified nurses on a unit and any of the three patient outcomes. The only statistically significant finding in this study was a positive association between workplace empowerment and the proportion of nurses who were certified in the intensive care unit (Krapohl et al., 2010).

Finally, Schuelke, Young, Folkerts and Hawkins (2014) examined the relationship between nursing intensity, nursing education and specialty certification as related to occurrence of adverse events and patient satisfaction. Lower nursing intensity was related to a significantly higher incidence of patient falls (Schuelke et al., 2014). Nursing education was positively associated with two patient satisfaction questions, "Nurse Communicates" and "Patient Advocacy". However, the percent of certified nurses or the

professional level of the nurses was not associated with any of the patient outcomes or the patient satisfaction questions (Schuelke et al., 2014).

Nurse Dose and Patient Outcomes

Previous studies have attempted to link the contributions of nurse staffing to positive outcomes for patients (Manojlovich & Sadani, 2008). However, dissimilar definitions of staffing variables and nurse characteristics limited the impact of findings (Manojlovich, Sidani, Covell & Antonakos, 2011). In order to advance these investigations, the concept of *nurse dose* has been posited as a standard, composite variable that could provide the needed structure for comparing, contrasting and aggregating future studies (Manojlovich & Sadani, 2008). *Nurse dose* encompasses two attributes: *active ingredient* (education, experience, skill mix) and *intensity* (FTEs, nurse: patient ratio, RN-HPPD) (Manojlovich, et al., 2011). Manojlovich et al. (2011) examined *nurse dose* and its association with methicillin-resistant *Staphylococcus aureus* (MRSA) infections as well as patient falls in adult acute care units. A significant relationship was found between both attributes of *nurse dose* and both outcomes (Manojlovich et al., 2011). The attribute of *active ingredient* was significantly correlated with MRSA ($r = -.43, p = .03$) and reported patient falls ($r = -.44, p = .03$). Likewise, *intensity* was also significantly correlated with MRSA infections ($r = -.70, p = .001$) and reported patient falls ($r = -.44, p = .03$). However, in the regression model with reported patient falls as the outcome, the *active ingredients* coefficient ($-0.66, p = .001$) was higher than that of *intensity* ($-0.48, p = .001$), suggesting that the mix of education, experience and skill mix may be more influential on patient falls than the *intensity* component of *nurse dose* (Manojlovich et al., 2011).

Discussion

Studies reviewed from the past five years present inconsistent conclusions in determining the association between nurse staffing, nurse characteristics and patient outcomes. The most consistent findings demonstrate an association between nurse staffing and nurse educational level with inpatient mortality and failure-to-rescue (Aiken, Cimiotti et al., 2011; Aiken, Sloane, Bruyneel, et al., 2014). Associations with other nurse-sensitive indicators such as patient falls and hospital-acquired conditions were inconsistent across studies (Blegen et al., 2013; Choi & Stagg, 2014). Notably, in the studies considered, nurse certifications alone were the least predictive of decreasing adverse events. However, some evidence suggested that emphasizing the importance of certification leads to nurses feeling empowered as well as positive about their overall work environments. This was also indicative in Magnet-designated facilities which tend to have higher proportions of baccalaureate prepared nurses and nurses with specialty certifications, improved staffing and better work environments (McHugh et al., 2013). To date, there are a limited number of studies examining the relationship between specialty certifications and patient outcomes. Thus, additional research will be required to fully appreciate the overall impact of specialty training on patients and the work environment.

Post review, there are two well defined gaps apparent in the literature. First, there is a need to increase research beyond an exclusive concern with intensive care and acute care units, expanding the focus to include the linkage of nurse sensitive indicators/outcomes in other specialty areas, such as in the perinatal setting. Limited studies have been published on the impact of nursing care on adverse obstetrical

outcomes. This body of work has primarily concentrated on the impact of continuous labor support on cesarean section rates in low-risk women (Gagnon, Meier & Waghorn, 2007; Hodnett, Lowe, & Hannah, 2002; Wilson & Blegen, 2010). Additionally, most studies related to neonatal outcomes are focused on the staffing and care neonates receive post-delivery instead of evaluating the impact of nurse staffing on neonatal well-being during labor (Wilson & Blegen, 2010). In settings such as a mother/baby unit, adverse events are rare which renders them generally ineffective as valid outcome measures. As noted by Simpson (2005), “even care that would be judged by expert peers to be substandard rarely results in injury or death” (p. 26). In this example, nurse sensitive care is better described through positive nurse driven outcomes like skin-to-skin contact after delivery and breastfeeding exclusivity at discharge.

The second deficiency in the current literature is the use of single nursing variables. More research needs to utilize the concept of *nurse dose*, facilitating the evaluation of outcomes based on a combination of nursing variables. The composite variable of *nurse dose* better reflects the complexity of nursing characteristics and allows for the evaluation of the level of nursing staff required to produce intended patient outcomes (Manojlovich et al., 2011; Sidani, Manojlovich & Covell, 2010).

Conclusion

Health care in the United States is under increased scrutiny due to higher costs and underperformance when compared with other industrialized nations (Kavanaugh, Cimiotti, Abusalem and Coty, 2012). The United States ranks behind other countries for quality outcomes, access to care, and efficiency in care (Davis, Stremikis, Squires & Schoen, 2014). The Patient Protection and Affordable Care Act (PPACA) directed the

Centers for Medicare and Medicaid Services (CMS) to initiate a value-based purchasing model as a means of controlling costs and improving quality of care (Kavanaugh et al., 2012). Value-based care provides incentives for improving quality of care and financially penalizes organizations for not improving or meeting benchmarks. Additionally, value-based purchasing provides transparency to consumers by publicizing patient experience data and rates of hospital-acquired conditions (Kavanaugh, et al, 2012). It is important that nurse leaders and nurse scholars understand this healthcare climate. Nursing comprises one of the largest labor forces in healthcare, but also provides the most hands-on care (Welton & Harper, 2015). Even with evidence linking nurse staffing to inpatient mortality and failure-to-rescue, hospitals still enforce lay-offs as a means to control cost and meet budgetary requirements (Kavanaugh et al., 2012). With the increasing cost of care and the need for further healthcare reform, nursing scholars must inspire and drive enhanced research initiatives that continue to quantify and qualify the role of nursing care in improving patient outcomes as well as decreasing costs. Evidence to date provides a compelling argument that the correct number of nurses and a higher proportion of baccalaureate prepared nurses improves outcomes. However, more information is needed to delineate the correct mix of staffing ratios and nurse attributes for optimal outcomes on any particular hospital service. The work evaluating the concept of *nurse dose*, and its attributes of *active ingredients* and *intensity*, provides a robust composite variable that has the potential to capture the influence and value of nursing care. Research utilizing the *nurse dose* concept could add evidence-based decision criteria to guide nurse administrators in specifying the optimal combination of *active ingredients* and *intensity* of nursing staff for different patient

populations (Manojlovich et al., 2011). To achieve this kind of specificity in the application of *nurse dose*, future research must expand beyond that of medical/surgical patient populations to define the differences in other populations such as pediatrics, mother/baby and long-term care.

Table 1

Literature Review Results

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Aiken, Cimiotti, Sloane, Smith, Flynn, Neff (2011).	Cross-sectional	<ul style="list-style-type: none"> • Nurse staffing • Nurse education • Nurse work environment (Practice Environment Scale of the Nursing Work Index-Revised) • 30-day Inpatient Mortality • Failure-to-rescue 	United States <ul style="list-style-type: none"> • 665 hospitals • 1,262,120 general, orthopedic and vascular surgery patients • Random sample of 39,038 hospital staff nurses 	<ul style="list-style-type: none"> • Reducing nursing workloads by one patient per nurse, did not reduce the odds of death or failure-to-rescue in hospitals with poor work environments. • In average work environments, the odds of both were decreased by 4% • In the best work environments, the odds of death was decreased by 9% & the odds of failure-to-rescue by 10%. • Increase the proportion of BSN nurses by 10% decreases the odds of both outcomes by 4% despite the work environment.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Aiken, Sloane, Bruyneel, Van Den Heede, Griffiths...Sermeus, (2014).	Observational	<ul style="list-style-type: none"> • Nurse staffing • Nurse education • 30-day in-hospital mortality 	Europe <ul style="list-style-type: none"> • 300 hospitals in 9 European countries • 422,730 patients 	<ul style="list-style-type: none"> • Increase in a nurses' workload by one patient, increased odds of inpatient death within 30 days of admission by 7%. • Every 10% increase in proportion of BSN prepared nurses was associated with a decrease in likelihood of dying by 7%.
Aiken, Sloane, Cimiotti, Clarke, Flynn, Seago...Smith, (2010)	Cross-sectional	<ul style="list-style-type: none"> • Nurse staffing • Nurse work environment • Inpatient mortality • Failure-to-rescue 	United States <ul style="list-style-type: none"> • 22,336 hospital staff nurses • Discharge data from 604 adult nonfederal acute care hospitals in California, New Jersey and Pennsylvania 	<ul style="list-style-type: none"> • California nurses cared for one less ICU patient and two less medical/surgical floor patients than those in comparison states. • Lower nurse/patient ratios were associated with lower inpatient mortality. • Nurses reported fewer patient complaints, fewer episodes of verbal abuse by patients and less concerns about quality of care when nurse/patient ratios equal that of California mandate.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Bae, Kelly, Brewer, Spencer, (2014).	Longitudinal	<ul style="list-style-type: none"> • Nurse staffing • Skill mix • Turnover • Temporary nursing staff • Patient falls • UAPU 	United States <ul style="list-style-type: none"> • Data from 35 units in 3 hospitals. 	<ul style="list-style-type: none"> • Patient falls/injurious falls were greater with higher temporary RN staff levels, but decreased with increased LPN hours/patient day
Blegen, Goode, Park, Vaughn, Spetz, (2013).	Cross-sectional	<ul style="list-style-type: none"> • Nurse education • CHF mortality • Pressure ulcers • Failure-to-rescue • Hospital-acquired infection • Postoperative DVT/PE • Length of stay greater than expected 	United States <ul style="list-style-type: none"> • 21 University Health Consortium hospitals 	<ul style="list-style-type: none"> • Hospitals with a higher proportion of BSN prepared nurses had lower rates of UAPU, postoperative DVT/PE, failure-to-rescue, CHF mortality and length of stay. • The correlation between hospital acquired infections was negative but not statistically significant.
Boltz, Capezuti, Wagner, Rosenberg, Secic, (2013).	Retrospective descriptive design	<ul style="list-style-type: none"> • Nursing specialty certification • Patient falls/injurious falls • UAPU • Restraint prevalence 	United States <ul style="list-style-type: none"> • 25 NICHE (Nurses Improving Care for Healthsystem Elders) hospitals 	<ul style="list-style-type: none"> • Units with a lower percentage of certified nurses were more likely to have falls. • Gerontology certification was not a significant predictor of any of the patient outcomes.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Boyle, Cramer, Potter, Gatua, Stobinski, (2014)	Retrospective repeated measures analysis	<ul style="list-style-type: none"> • Nurse specialty certification in perioperative units and surgical units (CAPA, CPAN, CNOR, CRNFA) • Central line associated blood stream infections • Catheter associated urinary tract infections • Hospital acquired pressure ulcers 	United States <ul style="list-style-type: none"> • Sample 1: 178 Surgical intensive care units matched with perioperative units in the same hospital. • Sample 2: 269 Surgical units matched with perioperative units in the same hospital. 	<ul style="list-style-type: none"> • Lower central line blood stream infections in surgical intensive care units were associated with higher rates of CPAN and CNOR/CRNFA in perioperative units. • Higher rates of CNOR/CRNFA were associated with higher rates of hospital acquired pressure ulcers in surgical units. These facilities demonstrated higher case mix index which indicates patients maybe at higher risk.
Boyle, Cramer, Potter and Staggs, (2015).	Secondary analysis of longitudinal data	<ul style="list-style-type: none"> • Nurse specialty certification • Total patient fall rates 	United States <ul style="list-style-type: none"> • 7,582 units in 903 hospitals who participate in the National Database of Nursing Quality Indicators 	<ul style="list-style-type: none"> • Small statistically significant relationship between RN national nursing specialty certification rates between 2004-2010 and total fall rates.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Carthon, Kutney-Lee, Jarrin, Sloane, Aiken, (2012).	Cross-sectional	<ul style="list-style-type: none"> • Nurse staffing • Post-surgical outcomes for older black adults including 30-day mortality • Failure-to-rescue 	United States <ul style="list-style-type: none"> • 548,397 patients ages 65 and older undergoing general, orthopedic, and vascular surgery (94% white; 6% black) 	<ul style="list-style-type: none"> • 30-day mortality was significantly higher for black than white participants when adjusting for age and sex. • One additional patient in the average nurses' workload was associated with higher odds of 30-day mortality for all patients. • Black patients experienced higher odds of death with each additional patient per nurse.
Cho, Sloane, Kim, E., Kim, S., Choi, Yoo, Lee, Aiken, (2015).	Cross-sectional	<ul style="list-style-type: none"> • Hospital characteristics • Nurse staffing • Nurse education • Nurse work environment (Korean Practice Environment Scale of the Nursing Work Index) • 30-day mortality 	South Korea <ul style="list-style-type: none"> • 14 hospitals • 1024 nurses 76,036 patients	<ul style="list-style-type: none"> • Nurse staffing, the work environment and the nurse educational level were all significantly associated with patient mortality.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Choi & Staggs, (2014).	Descriptive-correlational	<ul style="list-style-type: none"> • Nurse staffing: RN HPPD, Non-RN HPPD, Total nursing HPPD, RN skill mix, RN-reported number of assigned patients, RN-perceived staffing adequacy. • UAPU • Unit-level <ul style="list-style-type: none"> ○ RN education ○ Unit tenure • Hospital Characteristics <ul style="list-style-type: none"> ○ Staffed beds ○ Teaching status ○ Magnet status 	United States <ul style="list-style-type: none"> • Critical care: 558 units • Step-down: 406 units • Medical: 441 units • Surgical: 339 units • Medical-surgical: 653 units 	<ul style="list-style-type: none"> • Total nursing HPPD, RN HPPD and RN skill mix were highly correlated with RN-reported number of assigned patients. • RN-perceived staffing adequacy and RN skill mix were significantly associated with UAPU rates, with RN-perceived staffing adequacy being the stronger predictor.
Clark, Saade, Meyers, Frye, Perlin, (2013).	Retrospective analysis	<ul style="list-style-type: none"> • Perinatal Outcomes: fetal distress, birth asphyxia, primary cesarean delivery, chorioamnionitis, endomyometritis and a composite of adverse events • Frequency of 1:1 nurse staffing: based on quartiles of 1:1 care 	United States <ul style="list-style-type: none"> • 101,777 women who delivered and received oxytocin for induction or augmentation. 	<ul style="list-style-type: none"> • Facilities that provided 1:1 staffing less than 25% of the time had similar outcomes to those that provided 1:1 staffing greater than 75% of the time.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Diya, Van den Heede, Sermeus & Lesaffre (2011)	Retrospective analysis of cross-sectional data	<ul style="list-style-type: none"> • In-hospital mortality in the first post-operative intensive care unit • Unplanned readmission into the intensive care unit or operating room. • Nurse staffing variables: Nurse HPPD, educational level and intensity of nursing care 	Belgium <ul style="list-style-type: none"> • 9054 patients who received a coronary artery bypass graft or a heart valve procedures. 	<ul style="list-style-type: none"> • Hospitals with large volume of cardiac procedures saw a negative association between staffing and in-hospital mortality (higher staffing, less mortality). • In patient groups with low severity of illness, there was a relationship between nurse staffing levels and readmission to ICU or operating room.
Frith, Anderson, Caspers, Tseng, Sanford, Hoyt, Moore, (2010).	Cross-sectional	<ul style="list-style-type: none"> • Nurse staffing: RN or LPN hours per equivalent patient day (HPEqPD), skill mix • Adverse events: CAUTI, HAPU, hospital-acquired injuries • Length of stay 	United States <ul style="list-style-type: none"> • 4 small to medium community hospitals • 34, 837 patients 	<ul style="list-style-type: none"> • For every 1% increase in the percentage of RN staff, there would be a 3.38% decrease in the total number of adverse events. • Every 1 hour increase in RN hours would result in a decrease in length of stay by 16.54%. • Every 1 hour increase in LPN hours would decrease length of stay by 5.69%. • A 1% increase in percentage of RNs in the skill mix would expect a decrease in length of stay by 4.18%.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
				<ul style="list-style-type: none"> • A 1% increase in percentage of LPNs in the skill mix would result in a decreased length of stay by 2.49%.
Kendall-Gallagher, Aiken, Sloane & Cimiotti, (2011).	Secondary analysis of cross-sectional data	<ul style="list-style-type: none"> • Nurse educational level • Nurse specialty certification • Hospital characteristics: teaching status, bed size, high-technology • Inpatient deaths within 30 days of admission • Failure-to-rescue: Inpatient deaths for patients with complications 	United States <ul style="list-style-type: none"> • 652 nonfederal hospitals • 1,283,241 adult general, orthopedic and vascular surgical inpatients • Nurse survey data from 28,598 nurses 	<ul style="list-style-type: none"> • For every 10% increase in the proportion of BSN nurses in hospitals is associated with a 6% decrease in the odds of dying for surgical patients. • For every 10% increase in the proportion of BSN nurses with a specialty certification, there is a 2% decrease in the odds of dying for surgical patients. • The same effect is seen for failure-to-rescue.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Krapohl, Manojlovich, Redman, Zhang (2010)	Correlational, Descriptive	<ul style="list-style-type: none"> • Nurses perception of workplace empowerment (Conditions for Work Effectiveness Questionnaire-II) • Nurse Specialty Certification • Central line catheter-associated blood stream infections • Ventilator-associated pneumonia • Pressure ulcers 	United States <ul style="list-style-type: none"> • 25 adult intensive care units from 8 hospitals • Nurse survey data from 450 nurses 	<ul style="list-style-type: none"> • There was a positive and statistically significant relationship between nurses' perception of overall workplace empowerment and specialty certification (r=397, P=.05) • A strong, statistically significant inverse association between nurses' perception of empowerment and their reported level of experience was noted (r = -.505, P=.01) • No statistically significant relationship was noted between specialty certification and any of the nurse-sensitive patient outcomes.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Kutney-Lee, Sloane, & Aiken, (2013).	Retrospective, two-stage panel design (longitudinal)	<ul style="list-style-type: none"> • Nurse survey data from 1999 and 2006. • Nurse education level • Nurse reported staffing • Mortality within 30 days of admission • Failure-to-rescue 	United States <ul style="list-style-type: none"> • 134 hospitals • Total patients in 1999: 223,187 • Total patients in 2006: 244,147 	<ul style="list-style-type: none"> • A ten-point increase in the percentage of nurses with a BSN over the time period was associated with an average reduction of 2.12 deaths for every 1000 patients. • If the patient had complications, the average reduction of death was 7.47 deaths.
Lake, Shang, Klaus & Dunton, (2010).	Retrospective Cross-sectional	<ul style="list-style-type: none"> • Patient falls • Nurse staffing • RN staff composition • Hospital Magnet status 	United States <ul style="list-style-type: none"> • 108 Magnet hospitals • 528 Non-Magnet hospitals 	<ul style="list-style-type: none"> • Magnet hospitals had a 5% lower fall rate. • An additional hour of RN care per patient day reduced the fall rate by 3% in ICU's. • Additional LPN and NA hours increased the fall rate in non-ICUs.
Manojlovich, Sidani, Covell, Antonakos, (2011).		<ul style="list-style-type: none"> • Nurse active ingredient (education, experience, skill mix) • Nurse intensity (FTE, RN:patient ratio, RN-HPPD) • Hospital acquired MRSA rate • Patient falls rate 	United States <ul style="list-style-type: none"> • 12 units from a health system in Michigan Canada <ul style="list-style-type: none"> • 14 units in a health system in Ontario 	<ul style="list-style-type: none"> • Both attributes of nurse dose had a significant inverse relationship with MRSA infections. • Both attributes of nurse dose were also significantly associated with patient falls. However, the coefficient for active ingredient was bigger than that of intensity.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Mark & Harless, (2010)	Longitudinal	<ul style="list-style-type: none"> • Hospital Characteristics • RN staffing • Post-surgical complications (data with the present on admission indicator): pneumonia, septicemia, urinary tract infections, thrombophlebitis, fluid overload and decubitus ulcers. 	United States <ul style="list-style-type: none"> • 238 acute care hospitals in California 	<ul style="list-style-type: none"> • No statistically significant relationship was found between nurse staffing and post-surgical complications.
McHugh, Kelly, Smith, Wu, Vanak & Aiken, (2013)		<ul style="list-style-type: none"> • Hospital Characteristics • Nurse reported staffing • Nurse education • Nurse work environment measured by the Practice Environment Scale of the Nursing Work Index (PES-NWI). • 30-day inpatient mortality • Failure-to-rescue 	United States <ul style="list-style-type: none"> • 56 Magnet general acute care hospitals • 508 non-Magnet general acute care hospitals 	<ul style="list-style-type: none"> • Magnet hospitals had a 14% lower odds of mortality and a 12% lower odds of failure-to-rescue for surgical patients than the non-Magnet facilities. • Magnet facilities had significantly better nurse work environments along with higher proportions of bachelor prepared nurses and nurses with specialty certifications.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Needleman, Buerhaus, Pankratz, Leibson, Stevens, Harris, (2011).	Retrospective, Observational	<ul style="list-style-type: none"> • Inpatient mortality • RN staffing per 8 hour shift • Patient turnover 	United States <ul style="list-style-type: none"> • 197,961 patients 	<ul style="list-style-type: none"> • There was a significant association between risk of death and exposure to below-target or high-turnover shifts.
Park, Blegen, Spetz, Chapman & De Groot, (2012).	Descriptive, correlational design	<ul style="list-style-type: none"> • Nurse staffing (HPPD) • Patient turnover • Hospital characteristics • Failure-to-rescue 	United States <ul style="list-style-type: none"> • 42 hospitals: 759 nursing units ICU and non-ICU units • Approximately 1 million inpatients 	<ul style="list-style-type: none"> • In non-ICU's, higher RN staffing was associated with lower failure-to-rescue rates. • In non-ICU's, as patient turnover increased from 48.6% to 60.7%, the beneficial effect of increased RN staffing on failure-to-rescue is diminished by 11.5%.
Patrician, Loan, McCarthy & Fridman, (2011).		<ul style="list-style-type: none"> • Nurse staffing • Patient falls (with and without injury) • Medication administration errors 	United States <ul style="list-style-type: none"> • 13 Military hospitals 	<ul style="list-style-type: none"> • Greater proportion of RNs was significantly associated with fewer falls in medical-surgical and critical care units, but not in step-down units. • When a higher proportion civilian workers were on duty, less falls were noted. • A higher percentage of RNs was significantly associated with fewer medication errors.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
				<ul style="list-style-type: none"> • Again, higher proportions of civilian workers was associated with fewer medication administration errors, particularly in step-down and critical care units.
Schuelke, Young, Folkerts, & Hawkins, (2014).	Correlational, descriptive	<ul style="list-style-type: none"> • Nurse characteristics: (Level of professional development, specialty certification, highest nursing degree, nurse intensity) • Patient outcomes: Incidence of falls, medication errors, pressure ulcers, ventilator-associated pneumonia, central line associated blood stream infections, catheter-associated urinary tract infections, HCAHPS 	United States <ul style="list-style-type: none"> • Tertiary care center (4 units) • 213 nurses 	<ul style="list-style-type: none"> • The unit with a significantly lower value of nurse intensity also had a significantly higher incidence of patient falls. • The units with higher proportion of nurses with a higher education had a significant difference in their HCAHPS scores on “Nurse Communication” and “Patient Advocacy”. • No statistical significance between adverse patient outcomes and HCAHPS scores for nursing certification or professional development level (clinical ladder).

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Tzeng, Hu & Yin, (2011)	Exploratory	<ul style="list-style-type: none"> • Inpatient satisfaction measures: satisfaction with the responsiveness of hospital staff, satisfaction with the cleanliness of the hospital environment, satisfaction with the quietness of hospital environment. • Nurse characteristics: FTEs per 1000 discharges, percentage of RN FTEs by total nursing personnel FTEs • Hospital acquired injurious fall rates 	United States <ul style="list-style-type: none"> • 244 hospitals 	<ul style="list-style-type: none"> • Higher inpatient satisfaction measures with the quietness of the hospital environment was statistically significant for lowering injurious fall rates. • Lower all nursing personnel FTEs per 1,000 discharges and a lower percentage of RN FTEs was also significantly associated with decreasing injurious patient falls.
West, Barron, Harrison, Rafferty, Rown & Sanderson, (2013).	Cross-sectional, retrospective, risk-adjusted observational	<ul style="list-style-type: none"> • Risk-adjusted mortality for ICU patients • Nurse staffing • Consultant staffing • Intensivist staffing • Support staff • Workload 	United Kingdom <ul style="list-style-type: none"> • 65 Intensive Care Units • 38,168 patients 	<ul style="list-style-type: none"> • Higher number of nurses and higher number of consultants were associated with higher survival rates after controlling for patient characteristics and workload. • Number of nurses had the greatest impact on patients at high risk of death.

Author/Year	Design	Variables/Measures	Country/Participants	Key Findings
Yakusheva, Lindrooth, & Weiss, (2014).	Retrospective observational patient-level analysis	<ul style="list-style-type: none"> • Proportion of BSN care • Patient mortality • Readmission • Length of stay • Inpatient Costs 	United States <ul style="list-style-type: none"> • Urban Magnet-designated academic medical center • 10,310 patients • 1477 nurses 	<ul style="list-style-type: none"> • A 10% increase in the proportion of BSN-educated care (continuum variable) was associated with a 10.9% reduction in the odds of mortality • When evaluating the categorical BSN-educated nurse variable, patients who received greater than 80% BSN care had 18.7% lower odds of readmission and a 1.9% shorter length-of-stay compared to those who received less than 80% BSN care.

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Manuscript 2

The Effect of Nurse Dose on Breastfeeding Exclusivity – A Patient Level Analysis

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Abstract

Background: Breastfeeding is strongly associated with health benefits for children and their mothers. Despite this knowledge, breastfeeding rates in the United States have increased only slightly. Current research examines the relationship between nurse characteristics and patient outcomes in adult intensive care and acute care settings. To date there is very limited research examining nurse variables and outcomes in women and children, and very little knowledge regarding the characteristics of the nurse in relation to patient's breastfeeding success.

Purpose: The purpose of this practice inquiry project was to evaluate the relationship between the attributes of *nurse dose* and the immediacy and duration of skin-to-skin contact, as well as breastfeeding exclusivity at discharge.

Methods: A retrospective design was used to complete a patient-level analysis of electronic data. Logistic regression modeling was completed to evaluate mother and nurse variables in relation to skin-to-skin contact after delivery and breastfeeding exclusivity at discharge from the hospital.

Results: Mother's educational level and ethnicity were statistically significant predictors of breastfeeding exclusivity at discharge. The only significant nurse variable was specialty certification. Of those mother/baby couplets cared for by nurses with specialty certifications in obstetrics or lactation, 78.1% of them exclusively breastfed until discharge. Of those couplets not cared for by a certified nurse only 58.6% were exclusively breastfeeding at discharge from the hospital.

Key Words: *nurse dose, nurse staffing, nurse educational level, specialty certification, patient outcome, breastfeeding*

The Effect of Nurse Dose on Breastfeeding Exclusivity – A Patient Level Analysis

Breastfeeding is strongly associated with health benefits for children including an improved immune system, reduced incidence and severity of diarrhea, reduction in urinary tract infections and bacterial meningitis, as well as reduced risk of diabetes, lymphoma, leukemia and asthma (Murtagh & Moulton, 2011). Mothers experience health benefits as well, especially in the postpartum period with decreased postpartum and menstrual bleeding, increased child spacing and an earlier return to pre-pregnancy weight (Murtagh & Mouton, 2011). The Surgeon General's *Call to Action* to support breastfeeding in 2011 highlighted breastfeeding as the most effective measure a mother can take to protect her health and the health of her infant (United States Department of Health and Human Services, 2011). The American Academy of Pediatrics (AAP) recommends that infants should exclusively breastfeed for six months due to the health benefits for both infants and mothers (AAP, 2005). Despite this recommendation, breastfeeding rates in the United States have increased only slightly to 75% of mothers initiating breastfeeding with only 16.4% of babies continuing exclusive breastfeeding until 6 months of age (Centers for Disease Control and Prevention [CDC], 2013).

The literature details factors that influence breastfeeding exclusivity post-delivery as falling into three domains. First, breastfeeding is a health behavior impacted by the cultural values of the society (Demirtas, 2012). Age, culture, socioeconomic status, educational level, and family support all impact a mother's choice to breastfeed (DiFrisco et al., 2011). A second domain of influence focuses on maternity hospital practices that guide breastfeeding outcomes (DiFrisco et al., 2011). Particular attention has been given to skin-to-skin (STS) contact immediately after delivery. The American Academy of

Pediatrics (AAP) states that healthy infants should be placed STS with their mothers immediately after delivery until the first feeding (AAP, 2005). Placing healthy term infants STS with their mothers immediately after birth promotes positive interaction between the mother and her newborn (Anderson, Moore, Hepworth & Bergman, 2003). The contact promotes thermoregulation, eases the transition to extrauterine life and provides a natural opportunity for breastfeeding within the first hour of life (Anderson et al., 2003; Ferber & Makhoul, 2004). Additionally, other maternity practices such as providing formula to healthy breastfed infants has been associated with earlier weaning from breast feeding compared with babies who do not receive formula in the hospital (Bartick, Stuebe, Shealy, Walker & Grummer-Strawn, 2009). The third domain of influence is nursing knowledge regarding breastfeeding exclusivity and current evidence based practice (DiFrisco et al., 2011). DiGirolamo, Grummer-Strawn & Fein (2008) suggest that nurse sensitive care in the immediate postpartum period affects breastfeeding outcomes. Nurses trained and deemed competent in providing breastfeeding support and education to the mother/baby couplet inspire and motivate breastfeeding exclusivity (Baby-Friendly USA, 2010). Nurses that understand the impact of their practice on a mother's ability to successfully breastfeed her infant is a powerful incentive toward changing routine care.

As noted above, evidence based practice and nurses' knowledge of those practices has a significant effect on patient outcomes (AWHONN, 2014). Measuring the quality of nursing care is essential to demonstrate the impact of independent nursing practice (AWHONN, 2014). In order to better understand the relationship between nursing care and patient outcomes, researchers have examined different aspects of nursing such as

staffing ratios, experience, and education in relation to a variety of adverse events like inpatient mortality, failure-to-rescue and other hospital acquired conditions. Sidani, Manojlovich & Covell (2010) introduced the concept of *nurse dose* and its attributes of *active ingredients* and *intensity* to measure nursing knowledge and practice. They defined *nurse dose* as “the level (i.e. number and type) of nursing staff required to provide care that produces intended outcomes” (Sidani, Manojlovich & Covell, 2010, pp. 169-170). The *active ingredients* attribute of *nurse dose* was defined as the theoretical and practical knowledge of nurses and can be operationalized by educational level, experience and skill mix (Sidani, Manojlovich & Covell, 2010). The second attribute was the *intensity* of the *nurse dose*. *Intensity* captured the potential for nurse-patient interactions and can be operationalized by the amount and frequency of interactions (Sidani, Manojlovich & Covell, 2010). Thus, *intensity* is captured by the nurse-patient ration and the hours-per-patient day (HPPD) (Sidani, Manojlovich & Covell, 2010).

The purpose of this practice inquiry project was to evaluate the relationship between *nurse dose* and the immediacy and duration of STS contact, as well as breastfeeding exclusivity at discharge. The specific aims of the project were as follows:

1. What is the relationship between the attributes of nurse dose (educational level, specialty certification and experience in the unit) and the process measures of STS contact immediately after delivery and for the duration of one hour controlling for maternal characteristics such as age, educational level and previous breastfeeding experience?
2. What is the relationship between the attributes of nurse dose (education level, specialty certification, experience in the unit, number of lactation consultant visits) and

the outcome of breastfeeding exclusivity at discharge from the hospital controlling for maternal characteristics such as age, educational level and previous breastfeeding experience?

Review of the Literature

A search of the current literature (2010 – 2015) was conducted using the CINAHL database. Key terms used in the search were *nurse staffing*, *nurse educational level*, *nurse dose*, *specialty certification*, and *patient outcome*. After reviewing and comparing the results of the search, four themes emerged: (a) nurse staffing levels and the effect on patient outcomes, (b) nurse educational level and the effect on patient outcomes, (c) nurse specialty certification and the effect on patient outcomes and (d) nurse dose and the effect on patient outcomes.

The current literature presented inconsistent conclusions in determining the association between nurse characteristics and patient outcomes. The most consistent findings demonstrate an association between nurse staffing and nurse educational level with inpatient mortality and failure-to-rescue (Aiken, Cimiotti, et al., 2011; Aiken, Sloane, Bruyneel, et al., 2014; Aiken, Sloane, Cimiotti, et al., 2010; Blegen, Goode, Park, Vaughn, & Spetz, et al., 2013; Carthon, Kutney-Lee, Jarrin, Sloane, & Aiken et al., 2012; Kutney-Lee, Sloane & Aiken, 2013). However, associations with other nurse-sensitive indicators such as patient falls and hospital-acquired conditions were inconsistent across studies (Blegen et al., 2013; Clark et al., 2013; Mark & Harless, 2010). Notably, in the studies reviewed, nurse certifications were the least predictive of decreasing adverse events. Boltz, Capezuti, Wagner, Rosenberg and Secic (2013) found that units with a lower percentage of certified nurses were more likely to experience patient falls, but they

did not find any relationship between gerontology certification and patient falls, pressure ulcers or restraint prevalence. Additionally, Boyle, Cramer, Potter, Gatua, and Stobinski (2014) found an association between lower central line blood stream infections in surgical intensive care units and higher rates of certified post-anesthesia nurses (CPAN) and certified nurse – operating room (CNOR) in perioperative units. But, there was also an association between higher incidences of hospital-acquired pressure ulcers with higher rates of CNOR/CRNFA (Boyle et al., 2014). Finally, one study examined the concept of nurse dose in relation to its association with methicillin-resistant *Staphylococcus aureus* (MRSA) and patient falls in adult acute care units. A significant relationship was found between both attributes of nurse dose and both outcomes (Manojlovich, Sidani, Covell, & Antonakos, 2011).

Post review, there are two well defined gaps apparent in the literature. First, there is a need to increase research beyond patient outcomes in the intensive care and acute care units. Limited studies have been published on the impact of nurse sensitive care in specialty areas such as obstetrics and neonatal care. In settings such as a mother/baby unit, adverse events are rare which renders them generally ineffective as valid outcome measures (Simpson, 2005). In this case, nurse-sensitive care is better described through positive nurse driven outcomes like skin-to-skin contact and breastfeeding exclusivity at discharge. The second deficiency is the use of single nursing variables. The composite variable of nurse dose better reflects the complexity of nursing characteristics and allows for the evaluation of the level of nursing staff required to produce intended patient outcomes (Manojlovich et al., 2011; Sidani, Manojlovich & Covell, 2010).

Theoretical Model

Wilson and Blegen (2010) proposed a model to evaluate whether obstetrical staffing patterns impact the type of delivery a mother has or if it affects certain adverse maternal and neonatal outcomes. The proposed model was based on Donabedian's Quality of Care Framework (Wilson & Blegen, 2010). This classic model consists of three constructs: *structure*, *process* and *outcomes*. The *structure* and *processes* affect the outcomes (Wilson & Blegen, 2010). For this practice inquiry project, the *structure* is posited as the attributes of nurse dose (*active ingredients* and *intensity*). The *process* construct relates to the actual process of the care provided to patients. In this model, skin-to-skin contact is a process of care. Finally, the *outcomes* construct monitors metrics such as breastfeeding exclusivity at discharge.

Methods

Design

This practice inquiry project used a retrospective design to evaluate the effects of *nurse dose* on the immediacy and duration of STS contact between mother and newborn immediately after delivery and breastfeeding exclusivity at discharge from the hospital. The association was measured at the individual patient level. All data were extracted from the electronic health record and the registered nurse profile database. This project was reviewed and approved by the University of Kentucky institutional review board. Documentation of consent was waived.

Sample

The project was conducted at the birthing center of an academic medical center. The birthing center consists of a four bed triage unit, 12 labor/delivery/recovery rooms,

three operating room suites, four bed post-anesthesia care unit and a 26 bed postpartum unit. Approximately 1800 deliveries are performed each year. The birthing center focuses on high risk obstetrics which comprises 62% of all deliveries, but also has a low-risk population of primarily medical center and campus employees. A convenience sampling of all patients who began with the intent of breastfeeding and vaginally delivered a healthy term neonate (greater than 37 weeks, 0 days gestation) were included. Any term neonates requiring admission to the neonatal intensive care unit were excluded. Additionally, any mothers who were not alert or had a severe illness that prevented them from caring for their newborn were also excluded.

An *a priori* power analysis was conducted. Using up to 10 predictor variables, setting an alpha of 0.95, a power of 0.80, and assuming a moderate effect size of 0.15 indicated that at least 100 mother/baby couplets were needed to conduct a logistic regression. For this analysis, a sample size of 150 mother/baby pairs who delivered between July 1, 2015 and October 1, 2015 were included. Data were collected via electronic chart review including the direct care nurses, which resulted in a sample of n=149. One record was excluded as the medical record number was incorrect. An additional 18 records were excluded for the exclusive breastfeeding outcome analysis because these mothers noted the intent to formula feed on admission, and were noted as exclusive formula feeding at discharge. The final sample for the exclusive breastfeeding analysis consisted of 131 mother/baby pairs and 90 registered nurses. All 149 records were utilized in the analysis for skin-to-skin contact because this is offered to all patients of healthy term newborns despite their feeding choice.

Measures

Patient Outcomes

Skin-to-skin contact was coded as a dichotomous variable with nonoccurrence as the reference category. Exclusive breastfeeding at discharge was also coded as a dichotomous variable with formula supplementation noted as the reference category.

Patient Control Variables

Patient demographics were collected regarding age, race, ethnicity, educational level, gravida/para and breastfeeding history. Race and ethnicity were combined and coded as “Caucasian,” “African American,” or “Asian/other. Breastfeeding history was collapsed into a dichotomous variable (“yes” or “no”), regardless the range of prior breastfeeding difficulty. Educational level was consolidated into four categories including “some high school,” “high school graduate,” “some college” or “graduate level”.

Registered Nurse Variables

As previously noted, *nurse dose* consists of two attributes, *active ingredients*, operationalized as education, experience and skill mix, and *intensity*, operationalized as amount and frequency of direct nursing care. In order to capture *nurse dose* at the patient level, each nurse assessment was considered as assignment of the nurse for that time period. The electronic signatures of the nurses were extracted and linked to the hospitals RN profile database. The educational level, certification status and years of experience in the unit were retrieved from this database. The BSN proportion was calculated as the ratio of nurse assessments completed by BSN or post-baccalaureate degree nurses to the total of nurse assessments completed for the patient. The proportion of BSN care was

calculated as a continuous variable ranging from 0% to 100% BSN care, and as a categorical variable (greater than 80% BSN care). Specialty certifications were counted if current, and this variable was also calculated as a continuous variable ranging from 0% to 100% of care received by nurses with specialty certifications.

Because relatively few nurses had specialty certification (16.5% of the total nurse sample), a binary variable was used in analysis to represent whether any nurse who had an encounter with the patient had a certification. Nursing experience was coded as a categorical variable (greater than five years of experience in the unit). The five-year mark was used for two reasons. First, the staff ranged from less than one year to greater than twenty-six years, and was documented in multiple range categories. A dichotomous variable ensured adequate numbers in each category for analysis. Additionally, according to Benner, a “competent” nurse is one with two to three years of experience, but a proficient nurse performs with a more holistic understanding and has the ability for improved decision-making (Benner, 1982). Five years of experience allowed for nurses to have moved from the competent to a proficient skill level.

Analysis

Descriptive statistics and frequencies were used to describe the characteristics of the patient population and the nurse characteristics. Bivariate analyses, including the two-sample t- test, Mann Whitney U or chi-square test of association, were completed to test for differences in patient- and nurse-level characteristics for both STS contact and breastfeeding exclusivity as the outcome variables. Based on the bivariate analysis, logistic regression models were used to estimate the effects of the nursing characteristics on STS and breastfeeding exclusivity, controlling for patient-level characteristics. Data

were analyzed using the SPSS statistical software program, Version 23 (SPSS, Inc); an alpha level of .05 was used throughout.

Results

The patient population consisted of 74% Caucasian, 14.5% Asian/unreported and 11.5% African American. Of this group, 26% reported an ethnicity of Hispanic/Latino. The mean age was 27.62 (ranging from 17-44). The sample had variability in educational level ranging from less than high school education to graduate level. Although this was a first pregnancy for 33.6% of the sample, 41.2% did not have any previous experience breastfeeding. Overall, 91.6% of the mothers held their newborns STS after delivery, but only 63.4% of the mom/baby couplets were exclusively breastfeeding at discharge from the hospital (Appendix A, Table 1).

Analysis of nurse characteristics showed that 64.8% of nurses held a BSN or higher degree with 16.5% of nurses holding a specialty certification (Appendix B, Table 2). On average, patients were linked to 7.12 nurses from the point of delivery to discharge home (range of 5-12). Only 16.8% of patients received greater than or equal to 80% of their care from BSN-educated nurses. Approximately a quarter of patients (24.4%) received some care from a nurse with a specialty certification.

Bivariate Analyses

A bivariate analysis was completed to test the effect of each variable individually on the two patient outcomes of STS and breastfeeding exclusivity at discharge. Table 3 displays the effects of maternal variables and nurse characteristics on STS. There were no significant relationships detected between maternal variables and the outcome. However, there was a significant positive relationship between RN certification and

placing newborns STS after delivery ($p = .046$). Registered nurse education and years of experience in the unit were not significant.

A second bivariate analysis with the outcome of breastfeeding exclusivity revealed a significant positive relationship between mother's educational level and breastfeeding exclusivity at discharge ($p = .004$). The additional variables of maternal age, race and ethnicity as well as mother's breastfeeding experience and average breastfeeding scores while in the hospital were analyzed but did not demonstrate an association with breastfeeding exclusivity. When evaluating BSN education as a continuous variable or as a categorical variable with a threshold of 80% BSN care, the relationship was not significant. However, with specialty certification as a categorical variable, the relationship was significant in a positive direction ($p = .046$).

Direct logistic regression was performed to assess the impact of a number of maternal and nurse factors on the likelihood that mother's would perform STS contact with their newborns after delivery. The model contained four maternal variables (age, race, ethnicity and education) and three nurse variables (nurse educational level, nurse certification and years of experience in the unit). The full model containing all predictors was not statistically significant, ($\chi^2 = 6.943, p = .54$). This finding was likely due to limited variability in STS because over 90% of the mother/baby couplets performed STS post-delivery.

A separate logistic regression model was completed to evaluate the impact of maternal characteristics and nurse characteristics on the likelihood that mothers would exclusively breastfeed their newborn until discharge from the hospital. The model contained ten independent variables (age, education, race and ethnicity of mother,

breastfeeding history, STS post-delivery, number of lactation consult visits during hospitalization, nurse education, nurse experience and nurse certification). The full model containing all predictors was statistically significant, ($\chi^2 = 27.18$, $p \leq .001$), indicating that the model was able to distinguish between mothers who did and those who did not exclusively breastfeed until discharge. The model as a whole explained between 21.7% (Cox and Snell R square) and 30.2% (Nagelkerke R squared) of the variance in exclusively breastfeeding mothers and their care, and correctly classified 75.7% of the cases. As seen in Table 5, only three of the independent variables made a unique statistically significant contribution to the model (mother's educational level, ethnicity and nurse certification). When examining the variables related to the mother, mother's educational level recorded an odds ratio of 2.73. This result indicates that for every category increase in education, mothers were more than twice as likely to breastfeed exclusively until discharge from the hospital. Additionally, ethnicity (Hispanic/Latino) was significant (OR = 4.26, $p = .03$). Only one measure of *nurse dose*, certification, was statistically significant. Mother/baby couplets cared for by nurses with specialty certifications were four times more likely to exclusively breastfeed during hospitalization than those mothers who received none of their care from a certified nurse (OR = 4.46, $p = .02$).

Discussion

The purpose of this project was to evaluate the effects of the *active ingredients* of *nurse dose* on both STS contact and breastfeeding exclusivity. Unlike other studies that have demonstrated a relationship between nurse educational level and patient outcomes, BSN education was not a significant predictor of STS contact or breastfeeding exclusivity

at discharge (Aiken, Cimiotti, et al., 2011; Aiken, Sloane, Bruyneel, et al., 2014; Aiken, Sloane, Cimiotti, et al., 2010; Blegen et al., 2013; Carthon et al., 2012; Kutney-Lee, Sloane & Aiken, 2013). This finding may be related to the outcomes of being examined. In a traditional BSN program, only basic education is provided on lactation support. Additionally, nurse experience, of five years or greater, was also not a significant predictor. Nurses tend to equate experience with clinical expertise despite the findings of previous research that notes nurse experience was not a significant predictor of patient outcomes (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Kendall-Gallagher & Blegen, 2009). Additionally, it has been asserted that nurse experience does not substitute for education and certification (Kendall-Gallagher & Blegen, 2009; Stobinski, 2015). Basically, experience, by itself, does not appear to result in the same quality of nursing care delivered when a nurse is engaged in some form of life-long learning germane to her/his clinical work (Stobinski, 2015). The only nurse characteristic significantly associated with breastfeeding exclusivity at discharge was specialty certification.

Specialty certification is a means for registered nurses to validate their knowledge and skill in a particular area of expertise (Wilkerson, 2011; Kleinpell, 2009). Previous studies have shown that nurses with specialty certification have increased confidence and a sense of empowerment regarding their nursing practice (Wilkerson, 2011). Additionally, care provided by nurses with specialty certification has been associated with a decrease in adverse events such as patient falls and central-line associated blood stream infections (Boltz et al., 2013; Boyle, Cramer, Potter, & Staggs, 2015; Boyle, et al., 2014). However, other researchers have not found a significant relationship between specialty certifications and hospital-acquired infections, pressure ulcers, patient falls or

medication errors (Schuelke, Young, Folkerts & Hawkins, 2014; Krapohl, Manojlovich, Redman, Zhang, 2010).

Regarding the current investigation, 16.5% of the nursing staff held a specialty certification, excluding the lactation consultants. Patients cared for by bedside certified nurses were four times more likely to exclusively breastfeed at discharge when those nurses were involved in their care compared to those patients who did not have certified nurses. There are several possible explanations for this impact. First, nursing certification is not mandatory. Consequently, nurses that self-select to put in the added time and energy to pursue certification, that demonstrate a drive toward continuing clinical development are already the staff members that are clinically advanced, knowledgeable and interested in professional development (Cary, 2001; Wilkerson, 2011). However, in a 2001 international study of the Certified Nurse Workforce, 40% or more of nurses who were certified five years or less attributed the certification process to their improved confidence and ability in detecting patient complications and implementing the requisite interventions (Cary, 2001). This finding suggests the next possible, and most probable, explanation for the current inquiry's significant finding: the certification itself makes a difference.

Nine of the registered nurses held certification in inpatient obstetrical nursing, and six nurses held certification as certified lactation counselors (CLC) or international board certified lactation consultants (IBCLC). In order to seek certification from the National Certification Corporation (NCC) in inpatient obstetrics, the nurse must have a sound knowledge base and a minimum of two years clinical practice in the full spectrum of obstetrical care: antepartum, intrapartum, postpartum and normal newborn.

Approximately 15% of the questions are specifically focused on the postpartum period and the care of the newborn, including lactation and infant nutrition (The Center for Breastfeeding, 2012). The CLC process requires a 45 hour course, skill sessions and an exam that includes a practical and multiple choice exam. The IBCLC is similar but also requires clinical time under the supervision of an IBCLC prior to sitting for the exam. The rigor of the certification process, including both the didactic component and the practical skills, provides the nurse with a level of understanding and coaching skill simply not available through traditional nursing education or the typical experience gained through working on an obstetrical unit. In this study, only specialty certification was predictive of breastfeeding exclusivity. It is important to note that the number of lactation consultant visits alone was not statistically significant despite the training and specialty certification lactation consultants obtain. A plausible explanation is lactation consultants are not available to the patient around the clock and do not have the same amount of time and personal engagement with the patient that the bedside couplet nurse can bring. Lactation consultants concentrate their efforts on couplets experiencing difficulties beyond the commonly encountered struggles or complications the bedside nurse supports and solves with the patient as a matter of course.

Two attributes of the mother were significantly associated with breastfeeding exclusivity at discharge. First, Hispanic/Latino ethnicity was found to be a significant predictor of breastfeeding exclusivity at discharge. This result may be due to the fact that only those mothers who were admitted with the intent to breastfeed were included. Linares, Raynes, Gomez, Gokun, and Dignan (2014) previously reported that infant feeding intention was a strong predictor of exclusive breastfeeding at discharge in

Hispanic mothers in Kentucky. Second, Sutherland, Pierce, Blomquist and Handa (2012) reported women who had less than a college degree were less likely to initiate breastfeeding or were unsuccessful initiators. Likewise, this study found that the higher the mother's educational level, the more likely she was to exclusively breastfeed.

For the outcome of STS contact, bivariate analysis also showed a statistically significant relationship for certification, but the logistic regression model was not significant. This finding may be due to the lack of variability between the group that did STS and the patients who did not participate. Over 90% of newborns were placed STS after delivery which demonstrates this practice as the standard of care for term healthy newborns.

Limitations

Several limitations regarding the analysis should be noted. Due to the design of the project, causation could not be established. With logistic regression models, only the odds or probability of an outcome occurring can be predicted based on the conditions provided (Munro, 2005). Furthermore, evidence based practice notes that STS contact should persist until the first feed, or at least one hour without interruption (Dabrowski, 2007). Documentation of STS duration was missing on the majority of the patients in the study, preventing its inclusion as a variable for evaluation. Additionally, data on nurse experience extracted from the RN profile database was entered as various ranges instead of completed years of experience in the unit. Without years of experience as a continuous variable, it was impossible to create a true picture of the broad and varied experience within the study unit. Finally, as this project was a patient-level analysis, the nursing hours per patient day metric was not included. Additional research should be

completed inclusive of hours per patient day to better capture the composite variable of *nurse dose*.

Implications for Practice

Evidence based findings regarding nurse characteristics and their impact on nurse-sensitive outcomes in the perinatal population have been slim, at best. This study provides statistically significant findings supporting the notion that nurse specialty certification may be more predictive of successful breastfeeding outcomes for mother/baby couplets than a nurse's educational level, or years of clinical experience in obstetrics. Notably, in this study, number of lactation consultant visits also was not predictive of breastfeeding success. This organization has traditionally relied on lactation consultants, separate from mother/baby nurses, to drive the focus and interactions regarding breastfeeding support. These results indicate that when considering healthy term newborns, it may be more beneficial for mother/baby nurses to achieve certification allowing lactation consultants to focus primarily on high-risk concerns like breastfeeding in the neonatal intensive care unit and outpatient support for mother/baby couplets post-discharge.

In light of the above findings that years of experience and nursing degree do not equate to clinical acumen how, then, do nurse leaders assimilate and utilize this information for future organizational planning? First, additional research needs to utilize the concept of *nurse dose*. As a composite variable, *nurse dose* better reflects the complexity of nursing characteristics and allows for evaluation of the level of nursing staff required to produce intended patient outcomes (Manojlovich et al., 2011; Sidani, Manojlovich & Covell, 2010).

Second, there is a need to extend research beyond that of medical/surgical units and expand the breadth of inquiry to specialty areas. As demonstrated in this study, different nurse characteristics may be significantly associated with promotion of positive outcomes rather than merely avoidance of adverse events such as mortality, patient falls, etc.

Finally, nurse leaders and hospital administrators are the decision-makers for institutional policies to support the recruitment, retention and preparation of employees. If researchers can demonstrate which nurse characteristics, or combination thereof, are most strongly associated with specific patient outcomes, then leadership can create programs that incentivize clinical staff to meet those requirements. For example, this study implies that breastfeeding exclusivity rates could be improved if additional nurses were specialty certified in obstetrics and/or lactation. If organizations established programs that incentivized mother/baby nurses to gain certification, then more mothers and babies would experience the best opportunity to be successful in a healthy start together. Additionally, the institution would realize an impact through an improved family-centered experience, improved efficiencies and quality outcomes. Moreover, a societal return on investment would be captured through improved health for mom and baby, less sick visits to the pediatrician, and working mothers missing less time for care of an ill child.

Conclusion

The rising cost of U.S. healthcare, coupled with its shortcomings in outcomes, has raised an acute awareness that a problem with our healthcare system exists. The Patient Protection and Affordable Care Act directed the creation of a value-based purchasing

system to financially incentivize healthcare quality (Kavanagh et al., 2012). These concerns, coupled with changes in healthcare reimbursements require nurse leaders to continuously evaluate nurse-sensitive measures as a means to facilitate efficient quality care.

There is already consistent evidence supporting the relationship between nurse staffing, nurse education, nurse work environment and patient outcomes such as inpatient mortality (Aiken et al., 2003; Aiken et al., 2013). This practice improvement project adds to the current body of knowledge in two ways. First, specialty certification may be more influential on patient outcomes than education or experience, depending on the outcome being evaluated. Second, this project now raises the question as to whether the current findings regarding nurse characteristics and patient outcomes in medical/surgical units can be generalized to other patient care venues. Additional research must be conducted focusing on specialty areas in order for organizational leaders to translate the results into operational plans.

Table 1

Descriptive Statistics of Sample (N=131)

Variables	n (%)
Age	
Range	17 - 44
Mean (SD)	28 (5.959)
Race	
African American	15 (11.5)
Caucasian	97 (74.0)
Asian/Unreported	19 (14.5)
Ethnicity	
Hispanic/Latino	34 (26.0)
Non-Hispanic	97 (74.0)
Gravida	
One (First Pregnancy)	44 (33.6)
Two	31 (23.7)
≥ Three	56 (42.7)
Education*	
Less than high school	25 (19.1)
High school graduate	37 (28.2)
Some College	38 (29.0)
Graduate	27 (20.6)
Breastfeeding Experience*	
No previous experience	54 (41.2)
Some previous experience	60 (45.8)
Skin-to-Skin after delivery	
No STS	11 (8.4)
STS after vaginal delivery	120 (91.6)
Exclusive Breastfeeding at Discharge	
Breastfeeding with Formula	48 (36.6)
Supplementation	
Exclusive Breastfeeding	83 (63.4)
*Missing data	

Table 2

Descriptive Statistics of Nurse Level Data (N=90)

Variables	n (%)
Nurse Experience (years in unit)	
Less than 5 years	50 (54.9)
More than 5 years	40 (44.0)
Educational Level	
ADN	31 (34.1)
BSN	59 (64.8)
Certifications	
Yes	15 (16.5)
No	76 (83.5)

Table 3

Bivariate Analysis Skin-to-Skin Contact (N= 149)

Variables	Skin-to-Skin Contact		P value
	No (n = 14)	Yes (n = 135)	
	Mean (SD) / n (%)	Mean (SD) / n (%)	
Maternal Variables			
Age	28.29 (7.36)	27.25 (5.86)	.54
Race			.19
Caucasian	9 (8.4)	98 (91.6)	
African American	1 (4.5)	21 (95.5)	
Asian/Unreported	4 (20.0)	16 (80.0)	
Ethnicity			.71
Not Hispanic/Latino	11 (9.9)	100 (90.1)	
Hispanic/Latino	3 (7.9)	35 (92.1)	
Mother's Education*			.34
< High School Graduate	2 (7.4)	25 (92.6)	
High School Graduate/GED	4 (8.2)	45 (91.8)	
Undergraduate	4 (10.0)	36 (90.0)	
Graduate/Post-Graduate	4 (14.8)	23 (85.2)	
Missing Education Data		5 (100.0)	
Nurse Variables			
RN BSN			.17
No	3 (5.3)	54 (94.7)	
Yes	11 (12.0)	81 (88.0)	
RN Cert			.046
No	9 (7.3)	115 (92.7)	
Yes	5 (20.0)	20 (80.0)	
≥ 5 years of experience			.31
No	7 (7.5)	86 (92.5)	
Yes	7 (12.5)	49 (87.5)	

Table 4

Bivariate Analysis Breastfeeding Exclusivity (N=131)

Variables	Breastfeeding Exclusivity		P value
	No (n = 48)	Yes (n = 83)	
	Mean (SD) / n (%)	Mean (SD) / n (%)	
Maternal Variables			
Age	27.08 (6.5)	27.93 (5.6)	.44
Race			.35
Caucasian	37 (38.1)	60 (61.9)	
African American	3 (20.0)	12 (80.0)	
Asian/Unreported	8 (42.1)	11 (57.9)	
Ethnicity			.14
Not Hispanic/Latino	32 (33.0)	65 (67.0)	
Hispanic/Latino	16 (47.1)	18 (52.9)	
Mother's Education			.004
< High School Graduate	14 (56.0)	11 (44.0)	
High School Graduate/GED	19 (51.4)	18 (48.6)	
Undergraduate	10 (26.3)	28 (73.7)	
Graduate School/ Post-grad	5 (18.5)	22 (81.5)	
Missing Education Data		4 (100.0)	
Previous Breastfeeding Exp			.99
No	17 (45.9)	37 (48.1)	
Yes	20 (54.1)	40 (51.9)	
Average Breastfeeding Score	7.06 (1.15)	7.24 (.99)	.35
Nurse Variables			
Lactation Consultant Count	1.97 (1.14)	2.32 (1.09)	.12
Percent BSN			.06
< 80% BSN	36 (75.0)	73 (88.0)	
> 80% BSN	12 (25.0)	10 (12.0)	
Certification			.046
No	41 (85.4)	58 (69.9)	
Yes	7 (4.6)	25 (30.1)	
Percent Experience in Unit	.45 (.26)	.41 (.26)	.44

Table 5

Logistic regression modeling breastfeeding exclusivity (n = 131)*

	Odds ratio OR	95% Confidence Interval for OR	p
Maternal Variables			
Education	2.73	1.44 - 5.18	.002
Race			
Asian/Other	0.51	0.64 – 21.36	.31
African American	3.70	0.14 – 1.88	.14
Caucasian	ref	ref	.17
Ethnicity: Hispanic/Latino	4.26	1.12 – 16.19	.03
Age	1.01	0.91 – 1.11	.88
Breastfeeding Experience	1.49	0.47 – 4.72	.49
STS after delivery	0.77	0.11 – 5.19	.78
Nurse Variables			
BSN > 80%	0.34	0.10 – 1.20	.095
Experience > 5 years in unit	0.36	0.05 – 2.55	.31
Certification Present	4.47	1.22 – 16.29	.02
Lactation Consultant Visits	1.41	0.90 – 2.12	.13

*Only mother-baby couplets with complete data on all variables included in the model

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Manuscript 3

Affordable Care Act of 2010, Section 4207 Reasonable Break Time for Nursing Mothers

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Abstract

The American Academy of Pediatrics recommends that infants should exclusively breastfeed for six months due to the health benefits for both infants and mothers (Abdulloeva & Eyler, 2013). Despite this recommendation, only 16.4% of babies born in the United States are exclusively breastfed for six months (Centers for Disease Control and Prevention [CDC], 2013). The first decline in breastfeeding usually occurs at three months of age which coincides with mothers returning to work (Abdulloeva & Eyler, 2013). The Patient Protection and Affordable Care Act (ACA) amended Section 7 of the Fair Labor Standards Act of 1938 to support breastfeeding women when returning to work. Using Kingdon's "three stream framework", this paper analyzes the ACA, and the proposed bills surrounding the support of breastfeeding for working women.

Problem Statement

The American Academy of Pediatrics recommends that infants should exclusively breastfeed for six months due to the health benefits for both infants and mothers (Abdulloeva & Eyler, 2013). Despite this recommendation, only 16.4% of babies born in the United States are exclusively breastfed for six months (Centers for Disease Control and Prevention [CDC], 2013). The first decline in breastfeeding usually occurs at three months of age which coincides with mothers returning to work (Abdulloeva & Eyler, 2013). Additionally, research indicates that breastfeeding continuation rates are lower for mothers who work outside the home than mothers who stay at home (Bai & Wunderlich, 2013).

The Patient Protection and Affordable Care Act (ACA) of 2010 amended Section 7 of the Fair Labor Standards Act (FLSA) of 1938. This change to the FLSA requires employers to provide reasonable break time for an employee to express milk for her nursing child up to one year of age, and a private place other than a bathroom, free from intrusion by others, to use for expressing milk. Notably, it does not require employers to compensate the employee for the allotted break time. Furthermore, employers with less than 50 employees are not subject to this law if it imposes an undue hardship to the employer. The ACA does not preempt any State law that provides a greater protection for employees who wish to return to work and maintain lactation, protects only hourly employees, and does not provide any direction for a standard implementation of the law for employers.

Background and Significance

In the early 20th century, physicians recommended human milk as the best food for infants and the cornerstone of preventive medicine, but by the 1930's pasteurization of cow's milk prompted those in the lay and medical communities to believe that the difference between human milk and pasteurized cow milk was insignificant (Wolf, 2003). By early to mid-70's many mothers did not even initiate breastfeeding, relying solely on cow's milk based formulas (Wolf, 2003). It was not until the beginning of the feminist movement in the late 70's that women again rekindled an interest in breastfeeding (Wolf, 2003). Since then breastfeeding initiation rates have improved, but the practice of introducing formula prior to 6 months still persists (Wolf, 2003).

Breastfeeding is strongly associated with health benefits for children, including an improved immune system, reduced incidence and severity of diarrhea, reduction in urinary tract infections and bacterial meningitis, as well as reduced risk of diabetes, lymphoma, leukemia and asthma (Murtagh & Moulton, 2011). Mothers have seen health benefits as well, especially in the postpartum period with decreased postpartum and menstrual bleeding, increased child spacing and an earlier return to pre-pregnancy weight (Murtagh & Mouton, 2011). But many employers are unaware that research indicates there are economic benefits to breastfeeding for employers and society. For example, studies have shown higher employee productivity and lower absenteeism with working mothers who breastfeed, along with an increase in retention of these employees (U.S. Department of Health and Human Services [USDHHS], 2011). Improved breastfeeding rates save families from the cost of purchasing formula, and if exclusive breastfeeding

rates improve, significant healthcare savings are anticipated through improved mother and child health (Murtagh & Moulton, 2011).

According to the Bureau of Labor Statistics (2013), 57.3% of mothers with infants less than a year old are working. Furthermore, 64% of mothers introduce formula to their babies by the age of three months (Abdulloeva & Eyler, 2013). Thus, early introduction of formula may be explained in part by short maternity leaves and the lack of support for breastfeeding when these mothers return to work (Abdulloeva & Eyler, 2013).

Conceptual Framework

In the United States, policy development and implementation is a complicated process driven by special interest groups, professional organizations, politicians and people passionate about their issue (Kingdon, 2003; Greathouse, Hahn, Chizimuzo, Warnick & Riker, 2005). Kingdon (2003) describes this process as having three defined streams: Problem, Policy and Politics. The streams function independently of one another with the legislative agenda impacted more by the problem and political streams, than by the policy stream (Kingdon, 2003).

Kingdon (2003) points out, that in day-to-day legislating, many policy proposals are simply waiting to attach themselves to a problem as opposed to traditional problem-solving models where one begins with a problem and then looks for solutions. However, when all three streams are joined the probability of a significant policy change is dramatically improved (Kingdon, 2003). Kingdon's framework will be used to analyze this policy (Kingdon, 2003).

Analysis of the Issue

Problem stream

In Kingdon's framework, the *problem stream* describes how and why officials focus their attention on a specific problem. Problems come to their attention when there are indicators, data, a focusing event such as a disaster, or feedback that supports the notion a problem really does exist (Kingdon, 2003). In the case of breastfeeding, data and indicators have been critical to bringing about awareness. For example, the United States spent approximately \$9,255 on health per person in 2013 (Centers for Medicare & Medicaid Services [CMS], 2014). When compared to eleven other developed countries, the United States spent approximately \$5000 more per person with the poorest outcomes in overall health and efficiency (Davis, Schoen & Stremikis, 2010). The rising cost of U.S. healthcare, coupled with its shortcomings in outcomes, has raised an acute awareness that a problem exists. The Surgeon General's Call to Action to Support Breastfeeding in 2011 highlighted breastfeeding as the most effective measure a mother can take to protect her health and the health of her infant (USDHHS, 2011). The U.S. National Immunization Survey (NIS) indicates that of all births in the United States in 2010, 76.5% experienced any breastfeeding and only 37.7% were still exclusively breastfeeding at 3 months of age. NIS went on to report that exclusive breastfeeding dropped even further to 16.4% at 6 months of age (Centers for Disease Control and Prevention [CDC], 2013). Importantly, researchers have identified a dose-response relationship between breastfeeding and health (Wolf, 2003). For example, studies have shown an association between duration of exclusive breastfeeding and childhood obesity. Children who are breastfed for six months are less likely to become obese (USDHHS,

2011). These findings are highly significant as childhood obesity has more than doubled in children in the past 30 years, leading to other chronic health problems (CDC, 2007).

Furthermore, disparities exist in breastfeeding rates based on race, socioeconomic status and geography (USDHHS, 2011). African American women have breastfeeding rates 15-20% less than white women for initiation and at six months of age (USDHHS, 2011). The reasons are not understood, but culture and employment may have an impact. Education is also an indicator of breastfeeding, and women with less than a high school education are less likely to breastfeed (USDHHS, 2011). Additionally, women living in the southeastern United States are less likely to initiate or continue breastfeeding than other women in the U.S. (USDHHS, 2011). Some researchers have argued that if more African American women would breastfeed, that intervention alone may narrow the gap in infant mortality which is 1.3 times higher for African Americans than Whites (Wolf, 2003).

The American Academy of Pediatrics and the World Health Organization recommend exclusive breastfeeding for six months (AAP, 2012). Evidence clearly demonstrates the health and economic benefits of breastfeeding, yet exclusive breastfeeding rates in the U.S. drop dramatically at both three and six months of age (AAP, 2012). Obstacles to breastfeeding range from a lack of experience and family support to hospital practices that interfere with breastfeeding, and to the lack of accommodations when mothers return to work (USDHHS, 2011). Although the ACA Section 4207 addresses support for women returning to work, it does not do enough. Currently no implementation or evaluation plan exists for Section 4207, and employers

are left with questions and loopholes regarding specifics about the law and who is covered.

Policy Stream

The *policy stream* describes the process by which policy proposals are created, discussed and ultimately accepted as alternative solutions to the problem (Kingdon, 2003). Most of this process occurs within groups or communities of specialists that debate the possibilities (Kingdon, 2003). Only policies that are technically feasible, in line with one's values, and demonstrate effectiveness make the short list of surviving proposals (Kingdon, 2003).

Health care reform has been debated in the United States since before the enactment of Medicare and Medicaid in 1965 (Murray & Montgomery, 2010, March 22). In March 2010, President Obama signed the Patient Protection and Affordable Care Act into law and specific support for breastfeeding postpartum women returning to work was detailed in Section 4207. This section is the first federal law requiring support for mothers who wish to continue breastfeeding while working (Murtagh and Moulton, 2013). Additionally, Murtagh and Moulton (2013) note that "Congress's decision to use the FLSA as the legislative vehicle makes breastfeeding accommodation an integral part of the nation's labor laws" (p. 221). In doing so, this law provides all eligible mothers at least a minimum standard of accommodation that did not previously exist (Murtagh and Moulton, 2013). Allies of this amendment include professional organizations, special interest groups, advocacy groups and politicians. Professional organizations such as the American Academy of Pediatrics (AAP), The Association of Women's Health, Obstetrical and Neonatal Nurses (AWHONN), and The American College of Obstetrics

and Gynecology (ACOG) all support exclusive breastfeeding up to six months of age and provide position statements citing human milk as the standard for infant feeding (AAP, 2012). Additionally, nonprofit groups such as the United States Breastfeeding Committee (USBC) and special interest groups such as the National Alliance for Breastfeeding (NABA) advocate for protection, promotion and support for breastfeeding and endeavor to push the benefits of breastfeeding into the public health arena (Chang & Spatz, 2006). These organizations work to ensure that the public as well as the politicians understand the issues and have a knowledge base to make an informed decision.

Two different groups may oppose Section 4207 of the ACA. First, manufacturers of infant formula stand to lose generous profits if exclusive breastfeeding through six months of age improves significantly. Note that formula manufacturers are quite aware of this potential, and slant their advertising to match any changes in the national mood regarding breastfeeding. In the late 19th century, formula was initially advertised as a supplement to mother's milk because "mother's milk was not enough" (Kaplan & Graff, 2008). Today formula companies still provide free samples to new mothers along with information on infant feeding in their effort to keep women using their products despite the well-documented negative health effects (Kaplan & Graff, 2008). The International Code of Marketing of Breast-milk substitutes (the Code) defines appropriate and inappropriate marketing practices and outlines rules for protection of mothers from misleading advertising (USDHHS, 2011). The Surgeon General's Call to Action (2011) encouraged providers and hospitals to enforce the Code in an effort to minimize the negative impact of such advertising on exclusive breastfeeding.

The second group that may present opposition to supporting mother's breastfeeding while returning to work are companies that have limited space or that do not have an optimal coverage plan for breaks. In this case, employers may define "reasonable" differently than the employee, and they may not have a space free from intrusion to provide for the employee.

Since the passage of the ACA, two bills have been introduced to further support breastfeeding in the workplace. First, Senator Tom Harkin [D-Iowa] introduced S. 39 entitled the Healthy Lifestyles and Prevention America Act or HeLP America Act. Section 213 of this bill calls for the Secretary of Health and Human Services in conjunction with the Secretary of Labor to convene a task force to promote and support breastfeeding among working mothers. The duties of the task force will be consistent with the Surgeon General's Call to Action to support breastfeeding (2011) and to examine challenges that mothers face returning to work. The bill was read twice and referred to the Committee on Finance on January 22, 2013. No further action has been noted at this time.

A second bill, H.R. 1941, was introduced in the House on May 9, 2013 by Representative Carolyn B. Maloney [D-NY-12]. This bill, entitled the Supporting Working Moms Act of 2013, amends the Fair Labor Standards act of 1938 to extend the reasonable break time for milk expression to executive, administrative or professional capacity employees as well as hourly employees. H.R. 1941 was then referred to the House Committee on Education and the Workforce. No further action has been taken at this time.

Political Stream

The *political stream* is independent of the problem and policy streams (Kingdon, 2003). This stream is determined by election results, the national mood, pressure from interest groups, and partisan distribution in Congress (Kingdon, 2003). After the election of 2008, Congress was divided between the two major political parties and the opposing political stances created unprecedented policy gridlock. Health care reform became the focus of both parties, but the proposed solutions varied dramatically. Since the enactment of the Patient Protection and Affordable Care Act, the debate has continued. As the mid-term elections of 2014 resulted in a Republican majority for both the House and Senate, once again, health care reform is on the legislative agenda, and threats of repeal lead the talking points. The possibility of repeal is real; however, other strategists suggest that discontinuing coverage for the millions now covered would be political suicide for any party. More than likely, new legislation will be proposed that amends parts of the law without interfering with those already covered. Additionally, a presidential election occurs in two years with women voters, married and single, an important electorate for both parties. In order to gain their support, policy agendas must be focused on family, health and fair wages for women.

Policy Options

Although evidence clearly supports breastfeeding as the best source of nutrition for babies, barriers exist that deter mothers from initiating breastfeeding and cause them to discontinue breastfeeding or supplement earlier than the recommended six months (USDHHS, 2011). One identified barrier to the continuation of exclusive breastfeeding is when nursing mothers return to work (USDHHS, 2011). Women are faced with limited

break time to express milk, and many times the lack of an appropriate facility in which to express milk. The economics of maternity leave is also a limiting factor for women in whether they choose to breastfeed, or continue to breastfeed after returning to work (USDHHS, 2011).

Heymann, Raub and Earle (2013) evaluated national policies regarding the availability of breastfeeding breaks for working women and the resulting impact on breastfeeding. The review included 182 countries who had data for 2012 on the existence of a national policy for breastfeeding breaks in the workplace. The study found that 71% of the countries offered a guaranteed paid break (Heymann, Raub & Earle, 2013). The break time ranged from 30 minutes total to 2 hours with 82% of the countries allowing one hour of paid break time for breastfeeding (Heymann, Raub & Earle, 2013). It was demonstrated that exclusive breastfeeding rates were significantly higher when countries had national policies guaranteeing paid breastfeeding breaks at least until the baby was six months old (Heymann, Raub & Earle, 2013).

One policy option is to create new legislation that would support the extension of maternity leave, and offer payment during maternity leave. In the United States, employers with 50 or more employees are required to allow parents 12 weeks of Family Medical Leave annually to care for a newborn (Bai & Wunderlich, 2013). This law guarantees the employee can take the leave without fear of losing their job, but in most situations the leave is not paid (Bai & Wunderlich, 2013). The International Labor Organization (2014) sets the following as a benefit package for maternity leave: 1) at least 14 weeks off; 2) reimbursed at a level of at least two-thirds of their previous earnings and 3) the pay should be through state funds or social security (International

Labour Organization, 2013). The United States is the only country with a developed economy that does not meet at least one of these standards (Contorno, 2014 June 24). The Surgeon General's Call to Action (2011) also identifies paid maternity leave as a means to improve the success of breastfeeding. One proposed strategy is for states to consider utilizing the State Temporary Disability Insurance program as a funding source for paid maternity leave (USDHHS, 2011).

Another policy option is to create new legislation that combines H.R. 1941 and S.39 with some additional policy points. First, this legislation would include H.R. 1941 to cover all women employees (exempt or non-exempt) returning to work after maternity leave with a provision of adequate break time to express breast milk. This combined bill would also incorporate Section 213 of S. 39 outlining the establishment of a task force for the promotion of breastfeeding in the workplace. In addition to combining the language of these two bills, a provision would be added to allow a tax credit for employer expenses accrued in providing an appropriate environment and space for women to express breast milk upon returning to work (Humenick & Gwayi-Shore, 2001). Finally, the bill would include a plan for the implementation and enforcement of the *International Code of Marketing of Breast-milk Substitutes (the Code)*.

Best Policy Option

Although paid maternity leave is an important option, and the United States is significantly behind in this arena when compared to other developed countries, the likelihood of passing such a law in our current political climate is highly unlikely. However, combining the two bills currently in committees, while adding new options for employer credits and enforcement of the *Code*, will re-invigorate policy discussions on

health, prevention and support for women and families. Conversations focused on improvements for families, women and children are much more likely to be heard during the lead up to a presidential election, especially by Republicans who will certainly be looking for ways to keep their women supporters voting in favor of their candidates.

Strategies Moving Forward

Nurses need to play an active role in the promotion and support of breastfeeding at both the individual level with patients and at the policy level (Humenick & Gwayi-Chore, 2001). Nurses caring for mothers and children are in a critical position to educate women about the benefits of breastfeeding, and to help women initiate and maintain breastfeeding. But, no matter how effective a nurse may be at helping with initiation, without the support of policies and the general public, the culture around infant nutrition will be slow to change. This resistance to change is similar to what was seen when research emerged regarding seatbelt use and the hazards of smoking tobacco (Humenick & Gwayi-Chore, 2001). Despite mounting evidence, people were slow to change until policies were implemented and enforced.

Future strategies to promote breastfeeding must begin with education for the general public through a strong public service campaign. Following this campaign, healthcare providers should aide legislators in creating new policies that enforce the *Code*, and that provide support for lactating mothers up to an infant's first birthday.

The best policy option combines H.R. 1941 and S.39 with the addition of provisions for tax credits and enforcement of the *Code*. In order to begin this process, the representative and senator who presented the initial legislation should be contacted. Senator Tom Harkin [D-IA] submitted S. 39, but he is retiring at the end of this term.

Unfortunately, his bill did not have any cosponsors at the time it went to committee. Next, Representative Carolyn Maloney [D-NY-12] should be contacted, as well as the 20 co-sponsors for H.R. 1941. With the overall low breastfeeding rates and the evident disparities regarding race and socioeconomic status, other influential groups should be notified to assist in raising this as a public health issue. First among these groups is the Congressional Black Caucus (CBC). Established in 1971, the CBC has worked to empower minority citizens, with one of their prominent goals the elimination of racially based health disparities (CBC, 2014). Improving breastfeeding rates for women of color and creating policies that provide support to breastfeeding women returning to work would build a foundation towards healthier children and families. Another group of interest is the Congressional Caucus for Women's Issues. The Congressional Caucus for Women's Issues is a bipartisan caucus which has supported legislation such as the Pregnancy Discrimination Act and the Violence Against Women Act (Congressional Caucus for Women's Issues, 2014). With an upcoming presidential election, women and minority voters will play a pivotal role in the outcome. Therefore, a window of opportunity exists, and the next two years may provide the best chance for narrowing the legislative gap in support for breastfeeding mothers.

Potential Unintended Consequences

With a new Congress this year it will be difficult to develop strategies regarding any healthcare issues. Plans will need to be created for a "repeal the ACA" or "replace the ACA" outcome. The inclusion of S. 39, Section 213 which calls for the creation of a breastfeeding task force may cause additional debate if viewed as "more governmental involvement and regulation". Additionally, the enforcement of the Code will definitely

impact the profits for formula manufacturers, so one would expect to meet resistance depending on the lobbying efforts of those corporations.

Implementation Issues

The implementation of this policy would involve various organizations. First, the “reasonable break time” accommodations fall under the United States Department of Labor Wage and Hour Division. A monitoring plan is not proposed in this legislation, but if any employee felt that she was being discriminated against related to this law, then a complaint would be made to the Wage and Hour Division. The tax credit for creating an appropriate space and environment in which the employee may express breast milk would be addressed by the Internal Revenue Service. Employers would need to show evidence of cost in the form of receipts, renovation plans, etc.

The creation of the breastfeeding task force is outlined in S. 39 and would be established by the Secretary of Health and Human Services and the Secretary of Labor. A report shall be issued and sent to the Committee on Health, Education, Labor and Pensions of the Senate within one year of enactment of the task force that will outline recommendations regarding state and federal laws that may further support breastfeeding among working mothers, along with evidence suggesting the impact on healthcare costs (S. 39, Section 213).

Finally, the enforcement of the *International Marketing of Breast-milk Substitutes* would be voluntary by the manufacturers and tracked through the International Formula Council (USDHHS, 2011). Healthcare providers should stop distribution of any materials with free samples, notepads, pens, or growth charts that bears the logo of breast-milk substitutes.

Conclusion

Breastfeeding and human milk are the standard for infant nutrition (AAP, 2012). Despite the evidence, breastfeeding rates in the United States drop at both three months of age and six months of age. Initiation of breastfeeding and continuation of breastfeeding are even less in minorities such as the African American population and in those of lower socioeconomic status. With the continued rising cost of healthcare in the U.S., and health outcomes not equal to that of other developed countries spending less per person on healthcare, preventive measures and best starts such as breastfeeding are essential components for change in the healthcare system. According to the AAP (2012), “a detailed pediatric cost analysis based on the Agency for Healthcare Research and Quality report concluded that if 90% of U.S. mothers would comply with the recommendations to breastfeed exclusively for 6 months, there would be a savings of \$13 billion per year in healthcare cost”. Note this significant economic benefit is realized without including predicted savings from the expected decrease in employee absenteeism or reduction in employee turnover (AAP, 2012). Policies must be created to implement initiatives that provide this dramatic economic and health benefit for the mother, children and taxpayers of the United States.

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DNP Capstone Conclusion

Nurse sensitive care and the desire to measure the impact of nursing care is not a new concept (Burston, Chaboyer & Gillespie, 2013). Florence Nightingale recognized the importance of measuring the quality of nursing care in regards to patient outcomes, beginning with her inquiry into soldier mortality and morbidity during the Crimean War (Polit & Beck, 2004). This body of knowledge has advanced tremendously over time with focused work on central line associated blood stream infections, inpatient mortality, failure-to-rescue, and many other nurse sensitive measures. However, the structural variables and nurse characteristics investigated are primarily focused in the acute care and intensive care settings with patient adverse events utilized as patient outcome measures. Consequently, this practice inquiry project adds to the current body of knowledge in two ways. First, this project utilized the improvement of the positive patient outcome of *breastfeeding exclusivity* as a nurse sensitive indicator, instead of the prevention of adverse patient events. Second, results of the current study suggests specialty certification may be more influential than other aspects of nurse dose on patient outcomes, depending on the outcome being evaluated.

The next step for this project is to address and facilitate the transfer of knowledge. My goal is to concentrate efforts on publication of both the literature review and the practice inquiry project. Additionally, UKHC continues to strive for improvement of breastfeeding support for new mothers. Thus, the current findings will be shared with the birthing center team as different care models for mother/baby are considered.

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