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Implications of Perinatal Safety Nurse Fetal Monitoring Surveillance in the Labor and Delivery Setting

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Implications of Perinatal Safety Nurse Fetal Monitoring
Surveillance in the Labor and Delivery Setting

by

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A scholarly thesis presented to the faculty of
Gardner-Webb University School of Nursing
in partial fulfillment of the requirements for the
Degree of Master of Science in Nursing

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Abstract

Successful maternal and infant outcomes are the most important safety goals for all obstetrical units providing care for low and high-risk patients. The purpose of this research study was to describe how the implementation of the "Perinatal Safety Nurse" position in the Labor and Delivery setting effected fetal outcomes as well as provided an added level of safety. This study proposed that a direct correlation exists between fetal outcomes and fetal safety initiatives. The research design chosen for this proposal was a retrospective study that utilized a descriptive design. The data compared one hundred deliveries from January 2009 to December 2010 prior to the implementation of the perinatal safety nurse position, and one hundred deliveries from January 2011 to March 2012 after implementation of the perinatal safety nurse position. Outcome measures used to compare deliveries are as follows: delivery methods of vaginal vs. cesarean section; operative deliveries (forceps/vacuum); and unscheduled admission to the neonatal intensive care unit. C-section rates experienced a slight reduction from 31% in 2009-2010, to 28% in 2011-2012. NICU admissions data did reveal a statistically significant difference from 11% in 2009-2010, to 5% in 2011-2012. Operative deliveries also revealed a statistically significant difference ranging from 19% in 2009-2010, to 9% in 2011-2012. All three fetal outcomes measures revealed some improvement after the implementation of the perinatal safety nurse. Further research related to electronic fetal monitoring in the labor and delivery setting is needed, and should focus on the interaction between the nurse and client, health, environment, and the use of the nursing process to produce positive outcomes through innovative safety improvements.

Chapter 1

Introduction

Statement of the Problem

Successful maternal and infant outcomes are the most important safety goals for all obstetrical units providing care for low and high-risk patients. Unfortunately, there are times when the joyous event of birth can turn into tragedies related to neonatal death and birth injury. The Joint Commissions (TJC) report on sentinel events related to infant death and birth injury revealed that in 2009 there were over 900 reported perinatal deaths and permanent infant disabilities related to live births (2009). The current data on perinatal mortality in the United States reveals a rate of 6.9 deaths per 1,000 live births.

These alarming figures have presented a challenge to the obstetrical community and several healthcare systems to place a primary focus on doing “no harm” in the labor and delivery setting. The first line of defense in assessing fetal well-being during the intrapartum period is through the use of fetal surveillance. The purpose of intrapartum electronic fetal monitoring (EFM) during the labor process is to identify those fetuses that may have the potential to experience adverse outcomes during the birth process (Maude & Maralyn, 2009).

Disconcertingly, many case studies have revealed that inferior practice standards related to unstructured fetal monitoring policies and improper interpretation of the four main components of the fetal heart tracing – rate, variability, acceleration, and decelerations – have played significant roles in perinatal mortality and birth injury. Hindley (2005) attributes the discombobulated natures of fetal monitoring guidelines to different factors such as practice views by obstetrical practitioners, regions of the

country, experience of labor and delivery nurses, and personal interpretation of fetal heart tracings.

Background and Need

The primary objective of electronic fetal monitoring is to provide information with relation to fetal oxygenation and to prevent fetal injury that could result in impaired fetal oxygenation during labor (Fedorka, 2010). Since the advent of electronic fetal monitoring, there has been much debate over the relationship between the use of monitoring and overall fetal outcomes. While evidence has shown that continuous electronic fetal monitoring has increased the cesarean section rate as well as decreased in utero fetal seizures, research has not yet proven that adverse fetal outcomes have improved. With a faintly increasing infant mortality rate in the United States as compared to other developed countries (World Health, 2010), research and advanced studies of the most effective uses of electronic fetal monitoring is imperative to the quality of care delivered during the labor process.

Safety initiatives and best patient practices within the labor and delivery setting must become an intricate part of the successful delivery of obstetrical care. Providing best practices and safety initiatives is in a constant state of process improvement, which is established by the use of evidence-based practice, new innovative safety measures, quality improvement tools, and ideas for changing professional attitudes toward clinical practices.

The following is a brief but true case study that occurred at a 32-bed high-risk obstetrics facility in North Carolina that did result in an adverse fetal outcome. This study provides a clear picture of why safety initiatives related to fetal monitoring are crucial.

Permission was granted to provide brief details of this case. The patients name and Gravida/Para have been changed to maintain anonymity.

“Mona” is a gravida 1, para 2 at 38 weeks gestation who was sent to the labor and delivery unit from her physician’s office for normal onset of labor. Mona’s history and physical exam revealed a negative medical history and non-complicated obstetric history.

8:30 a.m. - Mona was placed on continuous electronic fetal monitoring (EFM) and tocodynamometer (TOCO). Cervical dilation was 3cm/50% effaced, and -1 station. Her membranes were still intact and the fetal head was determined to be the presenting part. Fetal Heart tracing revealed a baseline of 140 with moderate variability and 15x15 accelerations. Contractions were noted to be 3 to 7 minutes apart, lasting 30-90 seconds.

10:00 a.m. - “Mona” is complaining of increased pain in the right side of her lower abdomen and requests her epidural. Fetal Heart Tracing revealed a baseline 145 with moderate variability, and 15x15 acceleration. Contractions were noted to be 1-3 minutes apart, lasting 50-100 seconds.

10:15 a.m. - Epidural placement completed. Pt. experienced a decrease in blood pressure down to 80/50. Ephedrine 10mg was given to improve BP. In response to decreased BP a prolonged fetal heart rate deceleration was noted from 60-100bpm x 3 minutes with minimal variability and a return to baseline of 150bpm.

**After resolution of the fetal heart rate deceleration the nurse received a new admission with several complications. The labor and delivery unit was full and the nurse did not have “Mona’s” fetal heart tracing pulled up in her room while completing her new admission.*

11:00 a.m. - The nurse assess “Mona’s” fetal heart tracing baseline to be 165 with minimal variability and late decelerations. Cervical exam reveals dilation of 3.5cm/50% effaced, and -1 station along with large amount ruptured membranes with meconium stained fluid. The nurse performs interventions related to intrauterine resuscitation. After turning the patient in right/left lateral position, placing oxygen via non-rebreather mask, and completing a fluid bolus of 500cc’s, the fetal heart tracing reveals a baseline of 165 with minimal variability, no decels noted. The nurse returns to her other assigned room.

11:30 a.m. - The nurse returns to “Mona’s” room. The fetal heart rate is now 170, absent to minimal variability, with late decelerations. Her contractions are occurring at the rate of every 1-2 minutes, lasting 50-60 seconds. The nurse notifies the physician and a cesarean section (c-section) is called. During this time, the nurse was getting the patient ready for transfer to the operating room and was not fully cognizant of the fetal heart tracing which was still showing late decelerations.

12:15 p.m. - Delivery of infant via c-section with appearance, pulse, grimace, activity, and respiration scores (APGAR) of 1-3-5. Ph revealed severe acidosis. The neonate was admitted to the neonatal intensive care unit and stayed there for several months. Permanent neurological damage was sustained.

When examining this case it could be simple for the nurse to feel that, “This could never happen to me” or “What was that nurse thinking?”. A word of warning: If all practitioners were one hundred percent vigilant then there would not be a need to prevent birth injury through process improvement or become a part of litigations (Pearson, 2010).

It is because of this particular case that this facility took the crux of safety by the horns and implemented a new position titled “Perinatal Safety Nurse”, requiring one registered obstetrics nurse to actively observe and respond to alarms on all fetal heart tracings on a monitor as a back up to the primary registered nurse. This particular model was chosen related to the success that cardiac and critical care units have had utilizing surveillance of patient monitoring.

This position consists of a qualified registered nurse with over two years of high-risk obstetrical experience, advanced fetal monitoring certification, and sound clinical judgment related to interpretation of fetal heart tracings. The primary responsibility of the nurse assigned to this position is to assess, interpret, diagnosis, and initiate the appropriate chain of command as a backup to the primary nurse. This is a key safety driver in the labor and delivery setting to provide best practices through appraisal of clear and established nomenclature and guidelines. The objective of increasing neonatal status at birth through the use of continuous central electronic fetal monitoring (CEFM) needs to be effectively done through the use of published standards and guidelines, along with proper interpretation and appropriate intervention. Appraisal is extremely important and clear guidelines should be established.

Purpose

The purpose of this research study is to describe how the implementation of the perinatal safety nurse position in the Labor and Delivery setting has effected fetal outcomes as well as provided an added level of safety. This study proposes that a direct correlation exists between fetal outcomes and fetal safety initiatives. The data from this

study provides understanding about the impact of the perinatal safety nurse position in an effort to achieve and provide for maximum fetal safety and well-being.

Significance

The implications of utilizing the perinatal safety nurse position in the labor and delivery setting is positioned to provide an extra layer of protection to facilities' patients and medical staff. Assigning a primary nurse during the shift to assess, diagnosis, and implement the needed chain of command related to interventional changes in the fetal heart rate should serve to improve the quality and delivery of care. Through conduction of comparative research detailing outcomes prior to and after the implementation of the perinatal safety nurse position, positive neonatal outcomes should be revealed.

What can be interpreted overall is that “the key to greater safety is to improve the reliability and delivery of best practices” (Bion, 2007, p.36). This involves recognizing specific barriers to providing best practices along with implementing formal strategies to sustain improvements in the process of care and clinical behaviors. The global benefit of central electronic fetal monitoring is to detect early fetal distress resulting from fetal hypoxia and metabolic acidosis. Another benefit of the close evaluation of CEFM includes closer assessment of high-risk mothers. The goal of this study is to provide clear guidelines and statistical data supporting the use of a perinatal safety nurse position with anticipation that other labor and delivery units nationwide will follow suit.

Research Question

This study seeks to answer to the following question: “What fetal safety outcomes have been improved subsequent to the implementation of the “Perinatal Safety Nurse” position?”

Definition of Terms

For the purposes of this study, the use of the term “Perinatal Safety Nurse” will be the independent variable, with the reported fetal outcomes being defined at the dependent variable. Operational and conceptual definitions are defined below.

Table 1

Operational Definitions

| Term | Definition |
|---|---|
| Patient Medical Record-Quantitative Sentinel & Centricity Perinatal | Used for retrospective audit to compare APGAR scores, and admission to the Neonatal Unit. |
| Interview Questioner | Provided to obstetrical staff using Likert Scale as rating |

Table 2

Conceptual Definitions

| Term | Definition |
|----------------------------|---|
| Practitioner | Refers to all medical staff on obstetrical unit |
| Intrapartum | Any time fetus is being monitored at > 23 weeks gestation on the labor and delivery unit. |
| Labor and delivery setting | Includes all inpatient hospitals both high and low risk that offer obstetrical services |
| Baseline of FHR | Mean FHR rounded to increments of five beats per minute during a 10-minute segment |
| Normal range of FHR | 110–160 bpm |
| Variability | Irregular fluctuations in the baseline of the FHR. Measured as the amplitude of the peak to trough in bpm |
| Absent variability | Fluctuations in FHR range are undetectable |

| Term | Definition |
|---------------------------------------|---|
| Minimal | Fluctuations range observed at < 5 bpm |
| Moderate | Fluctuations range observed at 6–25 bpm |
| Marked | Fluctuations range observed at > 25 bpm |
| Accelerations in the fetal heart rate | Abrupt increase in FHR < 30 bpm |
| Variable deceleration | Visually apparent abrupt decrease in the FHR from the onset of the deceleration to the nadir of the contraction is < 30 seconds. |
| Late deceleration | Gradual: FHR decrease from the onset of the nadir of the contraction is > 30 seconds. Recurrent: Late Decelerations that occur with at least 50% of contractions in a 20 minute period Intermittent: occur with < 50% of contractions in a 20-minute periods. |
| Prolonged decel | FHR > 15 bpm below the baseline lasting > 2 minutes but < 10 minutes. |
| Uterine activity | Normal: < 5 contractions in 10 minutes Tachysystole: > 5 contractions in a 10 minute period. |
| Term gestation | Greater than 38 weeks gestation to 41.6 weeks gestation. |

Theoretical Framework

The research design chosen for this proposal is a retrospective study that utilizes a descriptive design. The theoretical framework and concepts used to complete this study are based on Orlando's Nursing Process and Concepts which deliberately focuses on the interaction between the nurse and client, health, environment, nursing therapeutics, perception validation, and the use of the nursing process to produce positive outcomes or

patient improvement (Nursing Theories, 2011). Figure 1 details the use of this framework for the implications of “Perinatal Safety Nurse” study (AWHONN, 2006).

This model highlights the steps of Orlando’s nursing process related to central electronic fetal monitoring and perinatal safety nurse guidelines to implement permanent practice changes. This should be viewed as a problem-solving process that is represented by a band of assessment, interpretation, diagnosis, intervention, evaluation, and collaboration among obstetrical practitioners.



Figure 1. Perinatal safety nurse framework.

The details of this continuum are as follows.

- *Assessment* – includes knowledge and experience to analyze and interpret a clinical picture. It is important in this step that you examine the whole clinical picture and decide what the next step is.
- *Interpretation* – This will guide the proper interventions.
- *Interventions* – Based on need and can be independent or collaborative.

- *Evaluations* – Use of interventions to determine if your goals have been met.

If not, the process is repeated.

It is of great importance to note that this process constantly moves in a circular motion and is never-ending. Continuous assessments by the perinatal safety nurse will direct this ongoing framework.

Conclusion

In conclusion, through the use of statistical data this study will provide understanding of changes in perinatal outcomes related to the implementation of the perinatal safety nurse position. This study will also provide evidence that further evaluation is needed on obstetrical units to determine the best use of staffing related to central fetal monitoring. The need for medical professionals to properly evaluate and willingly apply new safety practices is crucial to protecting a mother and fetus.

Chapter 2

Literature Review

The dilemmas identified in this research evolved from national initiatives to challenge current healthcare systems and to focus in on an effort to reduce harm and error. Evidence-based studies have revealed that over one hundred thousand patient deaths along with significant long-term complications could have been prevented with the implementation of safety standards. These figures are extremely alarming and equate to an average of two hundred and forty Boeing 747 aircrafts crashing each year. These numbers have been significant enough to catch the attention of the medical community and worldwide organizations.

This study of implications of perinatal safety nurse fetal monitoring surveillance in the labor and delivery setting places a research focus on perinatal well-being as well as a comprehensive initiative to promote patient safety for women who give birth. Nurses and organizations offering perinatal care are encouraged to incorporate the role of perinatal patient safety nurse in their patient safety efforts.

This literature review reflects facts and statistical data from CINAHL, Google Scholar, and Medline from 2007-2012. Searches were conducted with the following key words: fetal monitoring, electronic fetal surveillance, perinatal nursing, obstetric liability, perinatal safety, and NICHD guidelines.

Review of Literature

Nurses as patient safety experts are a fundamental component of contemporary obstetrical practice. Hospitals and healthcare systems are now developing perinatal patient safety programs to minimize risk of preventable patient harm. A case study

conducted by Rabb & Byfield detailed the role of the perinatal patient safety nurse as “a comprehensive initiative to promote patient safety for women who give birth throughout the nations” (2011, p. 284). This type of initiative requires an interdisciplinary team approach of patient advocacy, rapid response, and preventing harm to both mother and fetus. Rabb & Byfield, (2011) elucidate “the perinatal nurse has a central role in maintaining safety by scanning for and detecting emerging threats, deflecting them before they reach the patient, and coordinating team communications” (p. 285). Interpretation of fetal heart rate patterns is a key area where preemptive safety initiatives can be applied. The researchers suggested that all perinatal nurses monitoring and interpreting fetal heart tracing be electronic fetal monitor certified from National Certification Corporation's (NCC) examination process.

Providing best practices and safety initiatives is in a constant state of process improvement established by evidence-based practice. Bion (2008) focuses on the details of providing new innovative safety measures, quality improvement tools, and ideas for changing professional attitudes toward clinical practices.

Data collection of this evidence suggested the use of an explicit based criterion audit rather than an implicit based review. This was done to reduce the errors that can occur through broad based data as opposed to specific criterion. Data evaluation was based on several factors including interpretation of case note reviews between physicians and registered nurses, standards of care in place for acute versus long-term diagnosis, intervention rate, and design of previous trial studies (Bion, 2008, p 65). Of great interest was the fact that this research piece revealed that multiple discrepancies in data collection could be decreased through streamlining the data.

This analysis revealed that the greater focus on research studies for process improvement should be consistently placed on the following categories to ensure greater accuracy in results. These categories include the acute stay patient, large population samples, recognition and responsibility of staff, innovative research and design, and process control.

What can be extrapolated from all of this is that “the key to greater safety is to improve the reliability and delivery of best practices” (Bion, 2008, p. 63). This means moving away from the old school of thought that the only requirement of high quality research was to demonstrate the superiority of one intervention or treatment over another. This process involves recognizing specific barriers to providing best practices along with implementing formal strategies to sustain improvements in the process of care and clinical behaviors.

There is a strong need for medical professionals to properly evaluate and willingly apply new safety practices. This literature did prove that a gap in patient safety and quality improvement initiatives is lacking based on improper use of research methods and decreased quality of population controls. The need for more extensive research is warranted based on the lack of consistent evidence based initiatives. Further research in this area is imperative and will make the difference between life and death for our patients.

A retrospective study was conducted by Withiam-Leitch & Matthew (2006) to determine the relationship between central fetal monitoring and the effects on perinatal outcomes. Since the advent of electronic fetal monitoring there has been much debate over the relationship between use of monitoring and overall fetal outcomes. While

evidence has shown that electronic fetal monitoring has increased the cesarean section rate, research has not yet proven that fetal outcomes have improved. This study is imperative to the quality of care delivered to the normal laboring and high-acuity laboring patient in the labor and delivery setting.

The data collection used in this study consisted of a large sample population from a high volume and acuity birthing center comparing results of 3,007 deliveries that used continuous monitoring and 3,007 deliveries that did not use fetal monitoring. Data evaluation was obtained using the Western New York Perinatal Data System, which is an electronic data set based on birth certificate information. APGAR scores of less than 7 at 5 minutes, admission to the NICU, and cesarean section rate were all compared with and without fetal monitoring.

Analysis and interpretation of the data throughout this particular retrospective study revealed that no statistically significant differences were shown in cesarean section rate, neonatal intensive care unit admissions, or APGAR scores of less than 7 between the two sample groups of monitored and non-monitored women. There is a stronger association of benefits of central monitoring in the high-risk obstetric patient as opposed to the low-risk term laboring mother. The findings of this study have an impact on the appropriate use of fetal monitoring. The use of central monitoring in the high-risk obstetrics setting is appropriate and provides for better outcomes (Withiam-Leitch & Matthew, 2006).

The literature did reveal that a gap exists with regard to safety initiatives and the use of continuous electronic fetal monitoring. Along with the determined results, "it is impossible to know with one hundred percent certainly that a cesarean section was

medically based completely on the results of fetal monitoring” (Withiam-Leitch & Matthew, 2006, p. 286).

A retrospective audit conducted by Maude (2008) investigated multiple ways to improve best practices and eliminate barriers to common health care needs. The arena of intrapartum fetal heart rate monitoring is an area that requires constant reevaluation of current practice policy and usage.

Maude (2008) expanded on the stated practice problem, data collection and evaluation, analysis and interpretation of data, and the need for continued research in this field of practice.

The data collection consisted of a retrospective audit of 193 randomly selected medical records status post delivery. Charts were selected using the National Health Index (NHI) numbers and fetal charting in the medical record. The data was analyzed at the end of each month using an excel spreadsheet audit tool. Randomization and chart selection utilized by choosing 25 random charts per week for women who met the inclusion criteria (ex. Vaginal birth, non-elective c-section).

Descriptive Statistics were used for data analysis. Of the 193 Medical Records analyzed there was a significant discrepancy in use of electronic fetal monitoring, charting, and communication. 37.3% of those monitored had no indication for continuous monitoring. Annotation on questionable fetal heart tracings (FHT) was less than optimal, and proper documentation on fetal heart tracings was optimally completed only 12.6% of the time.

The results of this study have a tremendous effect on delivery of care related to fetal monitoring for registered nurses, nurse midwives, and physicians. Research

revealed that there was a deficiency in compliance with evidence-based practice regarding monitoring techniques, documentation, communication, and interpretation. This suggests that more research is warranted to address safety needs and appropriate use of fetal monitoring. A gap in research revealed that there was a deficiency in compliance with evidence-based practice regarding monitoring techniques, documentation, communication, and interpretation.

A clinical survey tool was developed and conducted by Hindley (2005) to appraise fetal monitoring guides for women at low obstetric risk. Different practitioners, regions of the country, and personal beliefs determine how fetal monitoring practices are conducted. While variances in practice can be beneficial, it is imperative to have a validation tool with regard to intrapartum monitoring of the low risk obstetric patient.

The practice problem of developing a tool to appraise fetal monitoring guidelines for low risk obstetrical patients is based on Boykins and Schoenhofer's (1993) model for transforming practice. The data collected was based on appraisals of 28 heads of large midwifery service practices who completed the "Appraisal of Guidelines for Research and Evaluation Instrument" (AGREE tool) formatted to encompass fetal heart rate statistical data. Evaluation of data was comprised of 28 questioners using structured statements accompanied by rating scale and comment boxes and summary scores.

Analysis and interpretation of the survey data revealed that there was a large number of discrepancies within the scoring of the data and comment boxes. Along with the above, midwife practices held different beliefs and ideas of how to appropriately monitor the low risk obstetrics patient.

Differing professional perspectives and variances in practice created a gap in research data and skewed the results of the appraisal tool. The results of this study reveal the important aspect of differing professional views along with varying use of guidelines with regard to fetal monitoring. Development of a fetal monitoring tool that allows for flexibility within evidence-based practice is key to appropriately monitoring the low risk obstetric patient.

A randomized controlled study conducted by Barstow and Gauer (2008) describes the effects of fetal monitoring and neonatal outcomes. Data collection for this study was based on a Cochrane systematic study that examined 12 randomized control trials and compared woman who received continuous electronic fetal monitoring with those who received only intermittent monitoring.

Control groups included a subgroup analysis of high-risk pregnancies that included the categories of advanced maternal age, diabetes mellitus, chronic hypertension, renal disease, preeclampsia, cardiac disease, renal disease, and previous delivery of a low-birth-weight infant. Evaluation of the data was based retrospectively on information obtained from the Cochrane meta-analysis, medical records, and fetal heart tracings based on NICHD guidelines.

Analysis and interpretation of the results yielded strong evidence that continuous electronic fetal monitoring reduces the risk of neonatal seizures by 50% as compared to intermittent fetal monitoring (Barstow & Gauer, 2008). However, continuous fetal monitoring does increase the incidence of cesarean sections by 66% and the incidence of operative vaginal delivery (forceps or vacuum suction) by 16%.

This study provides strong evidence that further evaluation is needed to determine the best use of continuous fetal monitoring along with providing solid statistical data pertinent to the benefits of continuous fetal monitoring in the high risk obstetrical setting.

A descriptive study was conducted by Bhogal and Reinhard (2010) to illustrate occurrences and prevention of maternal and fetal heart rate confusion during labor. Despite the many advances in electronic fetal monitoring, maternal heart rate and fetal heart rate confusion stills occurs in the practice setting. Disconcertingly, this mixing of electronic heart rates has resulted in unexpected poor neonatal outcomes along with neonatal deaths. Studies and updated practice standards are crucial to providing healthcare providers with new safety standards to prevent and improve neonatal outcomes.

Data collection for this research was based on data evaluation of comparisons between maternal and fetal heart rates that were simultaneously assessed using the abdominal fetal and maternal electrocardiograph (abfECG), which measures both maternal and fetal heart rates. Overall, evaluation of this data revealed a decrease in maternal fetal heart confusion and allowed for changes in the practice setting.

Analysis and interpretation of the data did present some complications showing that the use of the abfECG was somewhat tedious and time consuming. Prior to placement of this equipment it was imperative that the healthcare provider confirm fetal life through the use of an obstetric stethoscope, Doppler, or ultrasound. Along with this, changes in maternal heart rates and cardiac arrhythmias could have the potential to skew results.

The final results of this study reveal that the use of external pulse oximetry will provide the same results in a less tedious and more accurate fashion. The need for confirming maternal heart rate against the fetal heart rate is an essential part of the obstetric practice that cannot be taken lightly. This particular study confirms the need for two-nurse confirmation with regard to fetal heart rate verification.

A questionnaire study was conducted by Mancuso (2008) to examine the effects of electronic fetal monitoring and maternal emotional state. The research addressed the practice problem of maternal discomfort and distress related to prolonged continuous fetal monitoring. Data collection was based on a questionnaire answered by 204 pregnant women on continuous electronic fetal monitoring. The questions in the survey concerned socio-demographic background, personal obstetric history, and physician-patient relationship. The Edinburgh Postnatal Depression Scale (EPDS) was used to assess the patients' emotional state before continuous fetal monitoring was initiated. Along with this data collection tool, the Spielberger State-Trait Anxiety Inventory (STAI) was used to evaluate anxiety levels before and after this examination. Evaluation of data was based on the 204 patients enrolled in the study. Of the 204 women, 48 were excluded because they did not answer all of the questions.

Analysis and interpretation of this data was interesting in that the STAI anxiety score did not significantly differ before and after the use of continuous fetal monitoring based on Pearson's linear score of ($p = .38$). However, increased levels of anxiety were found in women who were smokers, preferred a vaginal delivery, and had the presence of obstetrical complications. In this group, the overall mean STAI S-anxiety score was

43.694.03 before the use of continuous electronic fetal monitoring, and then increased to 45.295.4 after.

This study exposed and concluded that many factors related to maternal stress in conjunction with the use of continuous fetal monitoring resulted in increased anxiety levels in pregnant women as well as increased risk for emotional distress.

A retrospective study was conducted by Sisco (2009) to determine the best of use of central fetal monitoring after incidental fetal heart rate decelerations. Data collection was established retrospectively on 97 patients who were 24 weeks gestation or greater who had received 36 hours of fetal monitoring status post fetal heart rate decelerations. Data was evaluated using NICHD guidelines and was based on patient medical records, fetal heart rate tracings, and gestational age.

Analysis of the data was completed through the use of descriptive statistics that described baseline characteristics of entire study group and two main groups were identified. They included those women who delivered during the same admission after the fetal heart rate deceleration and those who were discharged home after resolution of the fetal heart deceleration. The groups were compared through pregnancy and neonatal outcomes using the Chi-Square or Fisher Exact and Students *t* test for spontaneous and repetitive decelerations.

Interpretation of this data revealed that 45.4% of patients were presented to triage with complaints of preterm labor, 12.4% for elevated blood pressure, 12.4% for diabetes mellitus, chronic hypertension, or kidney infection, 19.6% had a poor OB history or increased risk such as mono/di twins, IUGR, placental problems, shorted cervical length, etc. The final 10.3% presented to triage for non-obstetrical complaints. Of the 97

subjects, 56 delivered during the same admission while 41 subjects delivered on a return admission to the hospital. The majority of patients did deliver at preterm gestation.

Gaps in the study reveal that further research is still needed to determine the effectiveness of prolonged fetal monitoring in the high-risk fetus. These findings also prompt clinicians to use caution when expending delivery related to spontaneous decelerations or continuous fetal heart rate decelerations. The evidence delivered is equivocal and proves that future evaluation of safety initiatives is crucial to protecting patients from unnecessary preterm deliveries.

Conclusion

The research conducted reveals and supports the need for the further implementation of safety initiatives within perinatal monitoring. The review of literature exposes gaps in research and reaffirms the necessity for further innovative perinatal safety nurse monitoring research.

In a rapidly evolving healthcare environment a culture of safety and exceptional practice should be woven into the fabric of corporate and professional practices. The Joint Commission (2009) advocates for health care practitioners and leaders to “conduct research and practice to improve our clinical environment to reduce the possibility of doing harm”. These types of safety behaviors are the rule and not the exception.

Chapter 3

Methodology

Purpose and Research Design

The purpose of this research study is to describe how the implementation of the "Perinatal Safety Nurse" position in the Labor and Delivery setting has effected fetal outcomes as well as provided an added level of safety for patients, and nurses. This study proposes that a direct correlation exists between fetal outcomes and fetal safety initiatives. The data from this study provides understanding about the impact of the perinatal safety nurse position in an effort to achieve and provide for maximum fetal safety and well-being.

The research design chosen for this proposal is a retrospective study that utilizes a descriptive design. This type of study was selected because “descriptive study designs are crafted to gain more information about characteristics within a particular field of study” (Burns & Grove, 2009, p. 291). The research design is based on a nursing perinatal safety survey, in correlation with the patients electronic medical record data regarding the use of continuous central electronic fetal monitoring (CEFM) occurring on the Labor and Delivery unit at an acute care facility located in North Carolina during the time frame of 2009 through 2012.

This hospital is designated as a regional perinatal-referral center that performs approximately 6,500 deliveries per year and the labor and delivery unit also functions as a “teaching” floor where anywhere between four and five residents, an attending physician, and a maternal fetal medicine physician are present at all times. All women admitted to labor and delivery receives continuous central electronic fetal monitoring.

The perinatal safety nurse protocol of assigning one obstetrically qualified registered nurse to continuously assess central monitoring on all active fetal heart tracings as a backup to the primary nurse was implemented in January 2010. Prior to that time only the primary nurse assigned to the patient was responsible for evaluation of the fetal heart tracing.

Sample Population

The sample population used for this study included pregnant women regardless of age and nationality who required the use of continuous electronic fetal monitoring during labor from January 2009 to March 2012. Inclusion criteria were based on term viable singleton pregnancies that were > 38 weeks gestation and they take account of both high and low risk pregnancies. Exclusion criteria included patients classified as observation status, all pre-scheduled cesarean sections, and those with indications for primary cesarean sections which include eclampsia, complete placenta previa, active genital herpes, cord prolapse, non-vertex presentation, hydrocephalus, neural tube defects, omphalocele, macrosomia, and multiple gestations.

Context

Prior to conducting a questionnaire and data collection, the researcher obtained permission and approval from the Internal Review Board (IRB) for Gardner-Webb University as well as the acute care facility in North Carolina. Informed Consent was gained prior to the data collection process (Gardner-Webb, 2011).

Informed Consent

Prior to surveying health care professionals who have agreed to participate in the study, informed consent was obtained. The informed consent form detailed the purpose

of the study and the rights for participating in proposed research study. Each participant had the opportunity to read and have explained to her the information on the consent form. At any time during the study questionnaire survey the participant could decline to participate. A copy of the consent form was given to all participants at the time of the initial survey questionnaire. The form provided the participant with contact numbers of the principal investigator (PI) and the Internal Review Board (IRB) at Gardner-Webb University. The detailed consent provided information concerning the potential risks and benefits of the study (Gardner-Webb, 2011).

Data Collection Methods

The data collection methods and measures were based on the above listed inclusion criteria of term viable singleton deliveries at > 38 weeks gestation that were born either vaginally or by unscheduled cesarean section. The research data was collected through retrospective audits of the patient electronic medical record, and the use of a safety initiative questionnaire. Collection tools included an appraisal of the electronic maternal/fetal medical record from Quantitative Sentinel (QS)/Centricity Perinatal, that details delivery methods, operative births, and intrauterine resuscitation.

In conjunction with the medical record, the instrument used to collect data included a survey questionnaire adapted by the researcher based on the “intradermal sterile water injection use in labor (ISWIL)” measurement survey tool (Garlock, personal communication 2012). The accumulated data questionnaire consisted of questions related to perinatal safety nursing, continuous central electronic fetal monitoring, personal practice background, and healthcare facility practices. This was measured with a weighted 5 point Likert-scale.

Data Analysis

The data analysis methods and measures are based on the above listed inclusion criteria of term viable singleton deliveries at > 38 weeks gestation that were born either vaginally or by unscheduled cesarean section between the years of 2009 and 2012. These measures include direct measurements of grouped frequency distributions and the Likert scale for medical professional's questionnaire.

The data compared one hundred deliveries from January 2009 to December 2010 prior to the implementation of the perinatal safety nurse position, and one hundred deliveries from January 2011 to March 2012 after active use of perinatal safety nurse position. Outcome measures that compare deliveries are as follows: delivery methods of vaginal vs. cesarean section; operative deliveries (forceps/vacuum); and unscheduled admission to the neonatal intensive care unit. This data also utilized a Likert scale survey to describe registered nurses confidence related to the implementation of the perinatal safety nurse, thus determining the overall benefit of the perinatal safety nurse.

Conclusion

In conclusion, statistical data will establish what improvements in perinatal outcomes related to the implementation of the perinatal safety nurse position have been accomplished. This study will also provide evidence that further evaluation is needed on obstetrical units to determine the best use of staffing related to continuous fetal monitoring. The strong need for medical professionals to properly evaluate and willingly apply new safety practices is crucial to protecting a mother and a fetus.

Chapter 4

Results

This study utilized a retrospective review that compared three intrapartum components: unscheduled cesarean sections (c-sections), admissions to the neonatal intensive care unit (NICU), and operative deliveries. Data analysis was conducted using descriptive statistics. Implementation of the defined inclusion criteria was used, and participants were divided into two groups: group one being prior to the implementation of the perinatal safety nurse from January 2009- December 2010, and group two was post implementation of the perinatal safety nurse from January 2011- March 2012. Both groups were equally divided into a study sample of one hundred per group to equal a total of two hundred participants that met inclusion criteria.

A small non-significant decrease ($p = .533$) occurred in the unscheduled c-section rate between group one and group two. In 2009-2010, 31% of the group one participants underwent unscheduled c-sections, and in 2011-2012, 28% of the group two participants underwent an unscheduled c-section.

The results indicated that NICU admissions experienced a significant decrease ($p = .014$) between the two groups. In 2009-2010, 11% of deliveries in the sample group were admitted to the NICU, as compared to 2011-2012, where 5% of deliveries were admitted to NICU.

Operative deliveries revealed a statistically significant decrease ($p = .001$) between deliveries within the pre and post perinatal safety nurse implementation. In 2009-2010, 19% of deliveries in sample group one required interventional operative delivery, as compared to sample group two in 2011-2012, where 9% of deliveries

required interventional operative delivery. Table 3 details statistical data related to outcome measure comparisons.

Table 3

Comparison of Outcome Measures for Unscheduled C-Sections, Admissions to NICU, and Operative Deliveries

| Outcome measures | Pre prenatal safety nurse group 1 2009-2010 No. (%) | Post prenatal safety nurse group 2 2011-2012 No. (%) | <i>p</i> |
|------------------------|--|---|----------|
| Unscheduled C-sections | 31/100 (31%) | 28/100 (28%) | .533 |
| Admissions to NICU | 11/100 (11%) | 5/100 (5%) | .014* |
| Operative deliveries | 19/100 (19%) | 9/100 (9%) | .001* |

* $p < .05$.

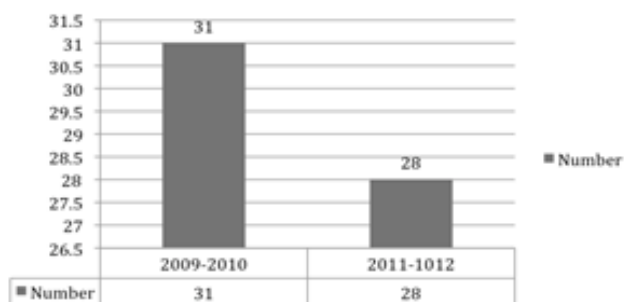


Figure 2. C-section rate.

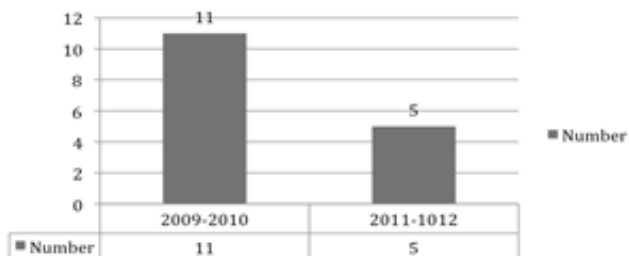


Figure 3. NICU admissions.

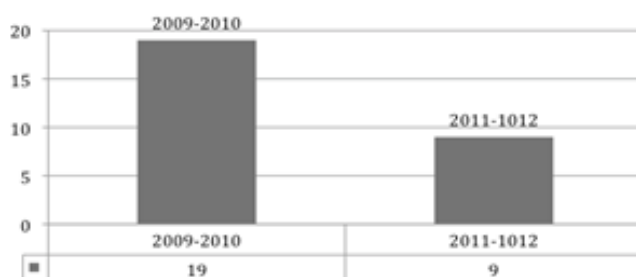


Figure 4. Operative deliveries.

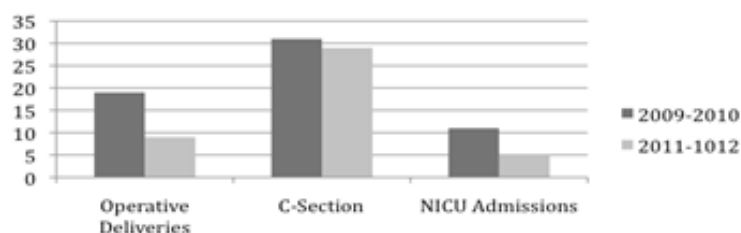


Figure 5. Comparative overview of measured outcomes.

Of the two sample groups, patient demographics revealed that the average fetal gestational age at time of birth was 39.2 weeks gestation ($SD = 0.604$) ranging from 38 weeks to 40.5 weeks gestation, and average maternal age was 23 years ($SD = 4.51$) with ages ranging from 16-39. The majority of the study population was unmarried, Caucasian women. Table 4 details the frequency and percentage rate the demographic data represented in this study.

A Likert scale survey, along with a demographic questionnaire was voluntarily distributed to 97 registered nurses who work within the perinatal safety nurse work environment (Table 5). Forty-five registered nurses participated and completed the survey in full. Twelve questions specific to CEFM and perinatal safety nurse implementation were listed on the survey with measured rankings for each question. These Likert rankings included 5 = *strongly agree*, 4 = *mostly agree*, 0 = *neither*

agree/disagree, 2 = *mostly disagree*, 1 = *strongly disagree*. The mean average for the ranking of all questions equals 4.475.

Table 4

Demographic Data

| | % | Frequency |
|------------------------|------|-----------|
| Weeks gestation | | |
| 38.0–38.6 | 32.5 | 65 |
| 39.0–39.6 | 55.5 | 111 |
| 40.1–40.6 | 12.0 | 24 |
| Maternal age (years) | | |
| 16–19 | 32.5 | 65 |
| 20–24 | 39.0 | 78 |
| 25–29 | 22.5 | 45 |
| 30–34 | 4.5 | 9 |
| 35–39 | 1.5 | 3 |
| Ethnicity/race | | |
| Caucasian | 44.5 | 89 |
| Black/African American | 26.5 | 53 |
| Hispanic | 22.0 | 43 |
| Asian | 6.0 | 12 |
| Native American | 1.0 | 3 |

The participants in this survey averaged a mean of 6.5 years of registered nurse experience in the labor and delivery setting. The demographics survey revealed that most participants hold an associates degree in nursing, and are serving in the staff nurse role.

Table 6 details the data from this survey related to, personal nursing practice background/demographics, and healthcare facility practices.

Table 5

Perinatal Safety Nurse Likert Survey Findings

| Item | Avg. score ^a |
|---|-------------------------|
| I feel comfortable evaluating and assessing CEFM on laboring patients? | 5 |
| CEFM is safe for the laboring mother? | 5 |
| CEFM is safe for the fetus? | 4.8 |
| CEFM is the most effective way to assess fetal well-being? | 3.2 |
| Healthcare providers support CEFM in your facility? | 4.6 |
| The staffing level is adequate to support a perinatal safety nurse? | 4 |
| Health care providers support the use of a perinatal safety nurse to monitor all patients on CEFM? | 3.9 |
| There are clear policies and procedures for providing CEFM for patients in labor? | 4.8 |
| Legal liability is a concern with CEFM in labor? | 5 |
| With the present rate of labor induction, & epidural analgesia, CEFM plays an important role in current intrapartum practice? | 5 |
| The use of a perinatal safety nurse will increase maternal and neonatal safety? | 4.2 |
| The perinatal safety nurse will decrease adverse safety events related to CEFM in the L&D setting? | 4 |

^a Scores based on self-rated reports on a 5-point Likert scale: 5 = *strongly agree*, 4 = *mostly agree*, 0 = *neither agree/disagree*, 2 = *mostly disagree*, 1 = *strongly disagree*.

Table 6

Perinatal Safety Nurse Survey Demographic Data

| Self-reported data | <i>n</i> |
|---|----------|
| Years of experience as a RN in labor and delivery setting | 6.5 |
| Highest completed nursing degree | |
| Diploma | 2 |
| Associates degree | 24 |
| Bachelor's degree | 16 |
| Master's degree | 4 |
| Job role | |
| Staff nurse | 40 |
| Assistant nurse manager | 2 |
| Nurse manager | 1 |
| Nurse educator | 2 |

Chapter 5

Discussion

Interpretation of Findings

The purpose of this research study was to describe how the implementation of the perinatal safety nurse position in the Labor and Delivery setting has affected fetal outcomes, as well as provided an added level of safety for patients, and nurses. This study examined fetal outcome components of unscheduled c-section rates, NICU admissions, and operative deliveries in an effort to determine if direct correlation exists between fetal outcomes and fetal safety initiatives. Of the 200 random sample participants the average maternal age was 23, and the average fetal gestation was 39.2 weeks. The average years of registered nurse experience equaled 6.5 years.

The results of this study support a partial correlation between improved fetal outcomes and fetal safety initiatives. All three fetal outcomes measures revealed some improvement after the implementation of the perinatal safety nurse. NICU admissions data did reveal a statistically significant difference from 11% in 2009-2010, to 5% in 2011-2012. Operative deliveries also revealed a statistically significant difference ranging from 19% in 2009-2010, to 9% in 2011-2012.

C-section rates experienced a slight reduction from 31% in 2009-2010, to 28% in 2011-2012. This non-significant finding within the study facility may be related to obstetric liability factors which dictate private practice obstetricians and residents to expeditiously treat fetal heart tracings requiring immediate intervention through means of a c-section delivery. Other related factors may include nulliparous induction of labor with an unfavorable cervix, fetal heart rate distress related to use of induction agents such

as oxytocin, and cytotec, and an increased use of alternative fertilization methods such as, invetro fertilization (IVF), and intrauterine implantation (IUI).

In conjunction with these finding, the study data revealed that facility c-section averages correlated with the national c-section trend of 32.8% in 2010, and 31.2% in 2011 as reported by the Centers for Disease Control (CDC) vital statistics finding (Hamilton, Martin, & Ventura, 2011).

Implications for Nursing

The findings within the statistical data suggest a partial correlation and overall benefit to the perinatal safety nurse role related to improvements in fetal outcomes. The use of central continuous electronic fetal monitoring in the labor and delivery setting is the most popular mode for registered nurses to monitor fetal well-being. Withiam-Leitch, Shelton, & Fleming state that, “90% of women delivering a baby within the United States of America will experience some form of central fetal monitoring” (2006,p. 287).

The profession of obstetrical nursing is challenged to keep with the plethora of technological advances in today’s world of modern medicine. It is imperative for registered nurses to have exceptional CEFM interpretation skills, along with a pioneering vision related to the use CEFM. The implementation of perinatal safety initiatives is essential for nurses to continue to maintain best patient practices, and keep safety first. Electronic fetal heart rate monitoring affects the lives of millions of women and infants each year.

Limitations of the Study

Several probable barriers to this study indicate that further research would be necessary to determine overall safety benefits. First, many uncontrollable variables such

as the minimal years experience of nursing staff, nurse to patient ratios, and quality of fetal heart tracing interpretation could have a large effect on the overall findings. Second, the sample size may not have been large enough to discriminate between outcome measure variables; thus, a larger sample size may have revealed significance in the area of c-sections. Third, the perinatal safety nurse initiative has only been established since January 2011 and is still in a continual process of being tweaked to meet maternal and fetal needs. Finally, new national perinatal initiatives such as limiting inductions to fetal gestations of >39 weeks, decreasing primary elective c-sections, and encouraging natural labor progression were initiated in mid-2011.

Implications for Further Research

Further research related to electronic fetal monitoring in the labor and delivery setting should focus on the interactions between the nurse and patient, healthcare environment, and the use of the nursing process to produce positive outcomes through innovative safety improvements. A thorough systematic review of the clinical nursing processes is central to supporting a safe obstetric environment.

Future perinatal safety nurse initiative research studies must also focus on proficient ways to create evidence based practice infrastructures related to improving outcomes within culturally diverse populations. Cultural factors such as, maternal primary language, beliefs related electronic fetal monitoring, culture perceptions of prenatal care, and patient's background and belief systems related to the labor and delivery process, can serve as the foundation for establishing new perinatal safety nurse initiative measures. Implementation of fetal safety initiatives and outcome measures

must continuously be evaluated to ensure quality and effectiveness for all obstetric populations.

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Appendix A

Gardner Webb University Institutional Review Board Approval Letter



THE INSTITUTIONAL REVIEW BOARD
of

GARDNER-WEBB UNIVERSITY

This is to certify that the research project titled
Implications of Perinatal Safety Nurse Fetal Monitoring Surveillance in the Labor and Delivery Setting

being conducted by Kellie Griggs

has received approval by the Gardner-Webb University IRB.

Date 5/3/12

Exempt Research

Signed Rindy Miller
Department/School/Program IRB Representative
Wickie Wadley
Department/School/Program IRB Member

Expedited Research

Signed _____
Department/School/Program IRB Representative

Department/School/Program IRB Member

IRB Administrator or Chair or Institutional Officer

Non-Exempt (Full Review)

Signed _____
IRB Administrator

IRB Chair

IRB Institutional Officer

Expiration date 5/3/13

IRB Approval:

☒ Exempt ☐ Expedited ☐ Non-Exempt (Full Review)

Appendix B

Author Permission to Use Measurement Instrument

From: Abby Elisabeth Garlock
Sent: Monday, April 02, 2012 2:57 PM
To: Ms Kellie Michelle Griggs
Subject: permission to use NPISWIL

Kellie,

You have my permission to use and modify the Nurses' Perceptions of Intradermal Sterile Water Injection Use In Labor Survey. Please let me know if you have any questions. Good luck with your thesis!

Abby Garlock

Appendix C

Informed Consent for Survey Participant Form

This is a research project being conducted by Kellie M Griggs, RNC, BSN graduate nursing student at Gardner-Webb University in Boiling Springs, NC .You are invited to participate in this research project because you are a registered nurse that works directly with patients receiving continuous electronic fetal monitoring (CEFM) under the new care design of the “perinatal safety nurse” initiative.

The purpose of this research study is to describe how the implementation of the "Perinatal Safety Nurse" position in the labor and delivery setting has affected fetal outcomes. This study proposes that a direct correlation exists between fetal outcomes and the implementation of fetal safety initiatives.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdrawal at any time. If you decide not to participate in this study or if you withdrawal from participating at any time, you will not be penalized.

The procedure involves completing a written survey that will take approximately 15 minutes. Your responses will be confidential as I will not collect identifying information such as your name, place of employment, or e-mail address. The survey questions will be about nursing demographics, and safety related to continuous fetal monitoring. Your information will be confidential. All data will be shredded after information collection is completed. To help protect your confidentiality, the surveys will not contain information that will personally identify you. The results of this study will be

used for scholarly purposes only and may be shared with Gardner-Webb University faculty and IRB members.

If you have any questions about the research study, please contact Kellie M Griggs, RNC, BSN at 336-972-7226 or kgriggs1@gardner-webb.edu. This research has been reviewed according to Gardner-Webb University IRB procedures for research involving human subjects.

CONSENT: Please select your choice below.

Check "agree" box to indicate that:

- you have read the above information
- you voluntarily agree to participate
- you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by checking on the "disagree" box.

☐- AGREE

☐- DISAGREE

Appendix D

Perinatal Safety Nurse Questionnaire

1. Have you provided nursing care for laboring women in the last 12 months?

() Yes-----Please Continue with Survey Questions

() No-----Thank you for your time and consideration to take this survey, however,
participants must have cared for laboring patients within the past 12 months.

Section 1

You will read some statements. For each statement, check (v) the box that indicates the extent to which you agree. Mark only one choice per question.

The following are some general questions about you and the facility where you provide care to laboring women. If you are not sure of the answer, your best estimate will be adequate.

1. Approximately how many birth per year take place in your facility? This includes both vaginal and cesarean deliveries.

_____ births per year

2. Approximately what percentages of patients are delivered via cesarean section?

_____ %

3. Approximately what percentage of all patients who deliver at your facility use continuous electronic fetal monitoring during labor?

_____ %

4. Who attends **most** of the births where you work? Select the one most appropriate response:

_____ Resident physicians

_____ Nurse-midwives

_____ Obstetricians

_____ Family Practitioners

5. In what type of setting do you provide care to laboring women?

_____ Hospital

_____ Birth center

_____ Other, please list _____

6. What best describes you current nursing role?

- ☐ Staff nurse
- ☐ Manager/administrator
- ☐ Clinical Nurse Specialist
- ☐ Advanced practice nurse/nurse practitioner
- ☐ Nurse-midwife
- ☐ Nurse educator
- ☐ Other, please list _____

7. How would you describe the level of obstetrical care at the facility where you practice?

- ☐ Level 1
- ☐ Level 2
- ☐ Level 3

8. In what type of unit do you practice mostly?

- ☐ Labor and delivery only
- ☐ Antepartum
- ☐ Neonatal
- ☐ Postpartum
- ☐ Labor, delivery, recovery, post partum (LDRP)
- ☐ Other, please list.

9. What is your highest degree in nursing?

- ☐ Diploma
- ☐ Associates degree
- ☐ Bachelors degree
- ☐ Masters degree
- ☐ Doctorate

10. How many years have you worked as a nurse?

_____ Years

11. How many years have you worked with laboring women?

_____ Years

Section 2

The abbreviation CEFM will be used throughout this survey to refer to Continuous Electronic Fetal Monitoring.

You will read some statements. For each statement, check (✓) the box that indicates the extent to which you agree. Mark only one choice per question.

| | Strongly agree | Mostly agree | Neither agree or disagree | Mostly disagree | Strongly disagree |
|---|----------------|--------------|---------------------------|-----------------|-------------------|
| 1. I feel comfortable evaluating and assessing electronic fetal monitoring on laboring patients in labor. | | | | | |
| 2. CEFM is safe for the laboring mother. | | | | | |
| 3. CEFM is safe for the fetus. | | | | | |
| 4. CEFM is the most effective way to assess fetal well-being. | | | | | |
| 5. Healthcare providers support CEFM in your facility (physicians/ nurse-midwives). | | | | | |
| 6. The staffing level is adequate to support a perinatal safety nurse monitoring all patients on CEFM behind the primary nurse. | | | | | |
| 7. Health care providers (physicians and nurse-midwives) support the use of a perinatal safety nurse to monitor all patients on CEFM | | | | | |
| 8. There are clear policies and procedures for providing CEFM for patients in labor | | | | | |
| 9. Legal liability is a concern with CEFM in labor. | | | | | |
| 10. With the present rate of labor induction, epidural analgesia, and cesarean delivery, CEFM plays an important role in current intrapartum practice. | | | | | |
| 11. The use of a perinatal safety nurse will increase maternal and neonatal safety | | | | | |
| 12. The perinatal safety nurse will decrease adverse safety events related to CEFM in the L&D setting. | | | | | |

Thank you for participating in this study!