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A Comparison of Perinatal Care Providers' use of the National Institute of Child Health and Human Development Standardized Terminology in Documentation of Intrapartal Fetal Heart Rate Patterns

Faye M. Sigman
University of Missouri-St. Louis, sigman@dscc.edu

A COMPARISON OF PERINATAL CARE PROVIDERS' USE OF THE NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT STANDARDIZED TERMINOLOGY IN DOCUMENTATION OF INTRAPARTAL FETAL HEART RATE PATTERNS

by

FAYE M. SIGMAN
B.S. in Nursing, May 1974, Murray State University – Murray, KY
M.S. in Nursing, August 1979, University of Tennessee – Knoxville

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Advisory Committee:

Jean Bachman, D.S.N., RN

Chairperson

Anne Folta Fish, PhD, RN

Ruth Jenkins, PhD, R.N.

Kathleen Rice Simpson, PhD, RNC, FAAN

Abstract

The purpose of this study was to determine if perinatal team members; nurses (RN) and primary care providers (PCP), were using the NICHD standardized terminology to document Fetal Heart Rate patterns during labor. Agreement in documentation of FHR and agreement in concept between the RN and PCP was also studied.

A descriptive, comparative research design was used. Cohen's Kappa statistics measured agreement in documentation of FHR patterns and Chi square measured agreement in concept, $p < 0.05$ for each. A retrospective medical records chart review was performed on 400 charts, meeting inclusion criteria, from three community hospitals. There were three data collection points and four criteria reviewed.

This study found the use of NICHD terminology to document FHR alarmingly low (RN=51%; PCP=13%). It was used most often for decelerations (81%) RN, (22%) PCP, and least often for variability (19%) RN, (3%) PCP. Incomplete documentation was extremely high for the PCP (69%) and 81 charts (20%) had no FHR documentation.

Agreement in documentation varied between the RN and PCP. They agreed most often on accelerations (81.4%) and least often on baseline rate (41.5%). When looking at all there points in time the RN and PCP agreed in documentation 59% but agreed in concept 78%. There were four areas where the RN and PCP agreed in their use of NICHD terminology: Accelerations on admission n=151, Kappa=0.091, p=0.007; variability during labor n=68, Kappa=0.27, p=0.015; variability prior to delivery n=33 Kappa=0.33, p=0.010 and decelerations during labor n=103, Kappa=0.16, p=0.018.

Data from this study supports expanding this research, to identifying barriers to documentation. It also appears that education in use of NICHD terminology is needed.

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CHAPTER 1

Introduction

Electronic fetal heart rate (FHR) assessment is a critical element of safe and competent care for the intrapartal woman and her newborn. Failure to interpret, communicate, and document FHR assessment findings accurately and in a timely manner may result in poor fetal and/or newborn outcomes and contribute to nursing negligence and legal liability (Fox, Kilpatrick, King, & Parer, 2000; Mahlmeister, 2000; Simpson, James, & Knox, 2006; Simpson & Knox, 2000; 2003; Symonds, 1994). The Joint Commission on Accreditation of Healthcare Organizations (JCAHO, 2004) found that communication failures accounted for 72% of reported infant injuries and deaths. Effective communication involves clear articulation of a plan of care, clear consensus regarding definition of terms for fetal heart rate characteristics, and a clear consensus of terminology for emergencies (JCAHO; Simpson, 2006a; Simpson et al., 2006). Safe practice and improved infant outcomes hinge on verbal and written communication among the perinatal health care team. Use of standardized terminology to communicate abnormal fetal heart rate tracings during the intrapartal period is a strategic move in the right direction in improving quality of life for the newborn (JCAHO; Miller, 2005; Parer & King, 2000).

Background

Electronic Fetal Monitoring

Electronic fetal monitoring (EFM) was originally developed as a screening tool to recognize FHR changes that identified a fetus at risk for asphyxia causing neurologic damage or fetal death (Feinstein, Torgersen, & Atterbury, 2003). Initially, only high risk

obstetric patients were monitored using the electronic fetal monitor. The basis of electronic fetal monitoring is that changes in the FHR are related to fetal brain function and certain patterns reflect asphyxia (Goodlin, 1979). Fetal response (heart rate changes) is evaluated in relation to uterine activity. Electronic fetal monitoring can be performed externally (indirectly) with belts applied to the maternal abdomen or internally (directly) with monitor devices applied intrauterine. External monitoring involves the use of a tocotransducer placed on the top of the abdomen (fundus of the uterus) to evaluate uterine activity, and an ultrasound transducer (cardiotocography), placed over the back of the fetus, to evaluate the FHR (Feinstein et al.). A spiral electrode is placed directly on the fetal presenting part for internal FHR monitoring.

Fetal Heart Rate Patterns

The initial definitions of FHR patterns originated in research papers from around the world in the 1960's (NICHD, 1997a). Since then, numerous groups have attempted to formalize the definitions of FHR patterns (American College of Obstetric and Gynecology [ACOG], 1989, 1995, 1997, 1998, 2002, 2005; Association of Women's Health, Obstetric, and Neonatal Nurses [AWHONN], 1993, 1998; National Institute of Child Health and Human Development Consensus Development (NICHD), 1997b; Nurses Association of American College of Obstetrics and Gynecology [NAACOG], 1980).

Alterations in the baseline rate were described as an acceleration or deceleration in the FHR (Feinstein et al., 2003). A range was used to describe baseline rate over a ten minute period of time. Variability was described as irregularities of the baseline FHR and classified by the amplitude in the fluctuations and number of cycle changes per minute

(Hon, 1963). Discrepant categories of variability evolved and there was no consensus on which category of variability should be used (Feinstein et al.).

Interpretation of FHR Patterns

Interpretation of FHR patterns during the perinatal period has been problematic because of the lack of agreement on definitions and nomenclature (Freeman, 2002). Pattern interpretation has been plagued by, vague, subjective terms and multiple interpretations (Freeman, 1990; Haggerty, 1999; Hefland, Marton, & Uleand, 1981; McDonald, Grant, Sheridan-Pereira, Boylan, & Chalmers, 1985). Verbal communication and chart documentation has exhibited many inconsistencies and frequently, nurses, midwives, and physicians in the same institution use different terms when charting FHR patterns. Terminology inconsistencies have posed serious consequences, for patient care, and health care providers in the event of litigation (JCAHO, 2004; Miller, 2005; Parer & King, 2000).

Electronic Fetal Monitoring and Litigation

Regardless of the type of fetal monitoring used during labor virtually all professionals believe that some form is necessary (Freeman, 2002). Even though there are no statistical advantages in using EFM over intermittent auscultation (ACOG, 1995) and there is a high false positive rate in predicting adverse outcomes, with no reduction in cerebral palsy rates (ACOG, 2005) perinatal healthcare providers continue to use EFM. In 2002, 85% of women in labor were assessed with electronic fetal monitoring, making it the most common obstetric procedure performed (Martin et al., 2003). According to Graham, Petersen, Christo, and Fox (2006) EFM is easier, cheaper, and provides more data than intermittent auscultation with a 1:1 nurse patient ratio.

Since the introduction of EFM litigation claims of negligent fetal injury during labor has increased significantly (Graham et al., 2006). The primary allegation is failure to perform a cesarean birth in a timely fashion in the presence of abnormal FHR patterns (Graham et al.). However, the lack of standardized terms and variations in EFM interpretation has added to the confusion in identifying and managing abnormal FHR patterns (Fox et al., 2000). Studies of FHR reliability have shown significant interobserver and intraobserver variation in tracing interpretation (Devoe et al., 2000; Hefland et al., 1981; Paneth, Bommarito, & Stricker, 1993) thereby, making interpretation and outcome correlation very difficult.

According to the ACOG 2006 Survey on Professional Liability (Wilson & Strunk, 2007), obstetricians and gynecologists have an average of 2.62 malpractice claims filed against them during their career. Of these claims 62.1% involve obstetric care. Neurologically-impaired infant claims are more likely to be the primary allegation of an obstetric claim (30.8%) than any other primary allegation. The second highest claim is stillbirth/neonatal death (15.8%).

Between 1985-2003 brain damaged infant claims were among the top five conditions for which compensation was sought, with an average indemnity of $509,280 (Physician Insurers Association of America, 2007). According to the 2003 National Practitioner Data Bank obstetrics related cases had the highest median ($290,000) and mean ($475,880) payment amounts, and took the longest amount of time to resolve. The median malpractice award for a childbirth related claim involving obstetricians and hospitals was $2.5 million for the period from 1997 to 2003 (Medical malpractice, 2005).

Cerebral Palsy

EFM has not decreased the occurrence of cerebral palsy (CP) in the United States (ACOG, 2005). The rates remain unchanged with an estimated 2.8 per 1,000 children aged 3 to 10 with cerebral palsy (Center for Disease Control and Prevention [CDC], 2004). The origin of the brain injury resulting in CP may occur during the antepartal, intrapartal, or postpartal period (Periman, 1997). Overwhelming evidence supports that 70% to 80% of cases are antepartal in origin with approximately 20% related to birth asphyxia (Blair & Stanley, 1988; Stanley & Alberman, 1984). The ACOG and the American Academy of Pediatrics (AAP) joint effort found that less than 25% of infants with neonatal encephalopathy had evidence of hypoxia or ischemia at birth (ACOG & AAP, 2003). The report also revealed that intrapartal hypoxia is rarely the sole cause of cerebral palsy.

The majority of persons with cerebral palsy require long-term supportive care or services. The estimated lifetime costs in 2003 dollars are expected to total $11.5 billion for persons with cerebral palsy (CDC, 2004). Average lifetime cost per person with cerebral palsy is estimated at $921,000. Cost of services is only one issue related to cerebral palsy. According to Boyle, Decoufle, and Yeargin-Allsopp (1994) the overall impact on health and school functions for children with developmental disabilities is greatest for children with cerebral palsy and epilepsy. These children also had much greater health care utilization, poorer school performance and a greater frequency of a fair to poor health rating by their parents.

History of Standardized Terms for FHR

The lack of agreement on definitions and nomenclature in FHR patterns resulted in the formation of a multidisciplinary panel of experts, consisting of physicians and nurses. The panel of experts convened 1995 through 1997 by NICHD (1997), a division of the National Institute of Health (NIH), to develop standardized, explicit definitions of FHR patterns that could be quantitated. The aim of the group was to propose definitions that would be applicable to either visual interpretation or computer processing. The panel was also presented the challenge of identifying a standardized management plan based upon FHR patterns.

This collaborative effort resulted in the acceptance of a standardized language for defining FHR patterns. The panel of experts did not come to consensus on a standardized management plan. However, there was agreement that normal FHR tracing's which include normal baseline rate, normal (moderate) variability, accelerations, and absence of decelerations, provide high predictability of a non acidic or normally oxygenated fetus (NICHD,1997a; Parer & King, 2000). The panel also agreed that absent FHR variability in the presence of recurrent late or variable decelerations, or a substantial bradycardia, were relatively highly predictive of present or impending fetal asphyxia, making the fetus vulnerable to neurological and physical damage or death. There was little disagreement on management of the above two patterns. However, they recognized that many fetuses have FHR patterns between these two extremes in which case consensus on management could not be reached.

As a result of the 1997 collaborative effort, many institutions, and clinical practices began using the standardized language for FHR terminology. It was taught in

educational seminars across the country and internationally. However, medical and nursing professional organizations, did not adopt the standardized language as a standard of practice until ten years later (Miller, 2005; Parer & King, 2000).

In July 2004, JCAHO issued a sentinel event alert addressing perinatal death or permanent infant disability. Sentinel Event Alert No. 30 presented a summary of the 71 sentinel events that had been reported since 1996. Seventy-two percent of the events were related to communication issues. Risk reduction strategies are required under the Sentinel Event Policy to reduce the risk of similar future adverse events. One of the strategies that the Joint Commission recommended was that organizations review and apply the AAP and ACOG guidelines for perinatal care including educating nurses, residents, nurse midwives, and physicians to using the standardized terminology to communicate abnormal FHR tracings (JCAHO, 2004).

As a result, in 2005, the standardized language for fetal heart rate patterns was accepted as a standard of practice by AWHONN (2005) and ACOG (2005b). According to the literature (Althaus, Petersen, Fox, Holcroft, & Graham, 2005; Cherouny, Federico, Haraden, Leavitt, & Resar, 2005; Parer & King, 2000; Simpson, 2006b; Simpson & Knox, 2003) standardized language improves multidisciplinary communication, enhances clinical decision making, and improves neonatal outcome. Miller (2005), states that standardization of FHR terms will promote meaningful research in the area of fetal assessment during labor and neonatal outcomes. Althaus et al. also states that standardization of FHR terms will enhance randomized research methodology.

Significance of Study

Patient safety and wellbeing are the primary goals of perinatal healthcare. Recent data supports that communication issues are key factors in adverse perinatal outcomes, which includes documentation of FHR. Therefore, healthcare providers who use the same EFM language for documenting FHR promote professional communication, improve medical record documentation, improve fetal neonatal outcomes, and decrease potential liability (Simpson & Knox, 2000). This study will review charts to see if labor and delivery team members are documenting FHR during labor, using the approved, standardized terms and if they are documenting the same findings.

Problem Statement

Now that standardized FHR terminology has been mandated by JCAHO, and adopted by AWHONN and ACOG as standard of care, it is imperative to determine if the perinatal care team members are using the standardized terminology. Currently, there is scant research to support that the perinatal team is using the standardized terminology in practice. Use of inappropriate FHR terminology can increase risk of adverse neonatal outcomes, infant injury, or death (JCAHO, 2004). Failure to use standardized FHR terminology can also lead to litigation even when newborn injuries are not a result of an injury during labor and birth. Research is needed to determine how widely the standardized terms are being used. A standardized language will provide more research validity and pave the way for standard algorithms for management of care for the perinatal clients in the clinical setting (Parer & King, 2000).

Purpose of the Study

The purpose of this research study is to determine whether perinatal team members are using NICHD definitions when documenting FHR patterns during labor. This study also seeks to determine if there are differences in FHR documentation between the primary perinatal care provider and the labor and delivery nurse.

Research Questions

The study is designed to answer the following two questions:

1. Are perinatal team members using the NICHD standardized terminology to document FHR patterns during labor?
2. Are primary perinatal care providers and labor and delivery nurses in agreement when documenting FHR patterns?

CHAPTER 2

Literature Review

A detailed search of CINAHL, MEDLINE, OVID, ArticleFirst, PsycINFO, PubMed, Dissertation Abstracts, and The Cochrane Library databases reveals sparse evidence based research articles that look specifically at use of standardized terminology in documentation of intrapartum fetal heart rate patterns. Therefore, CINAHL, MEDLINE, MedlinePlus, OVID Healthstar, OVID MEDLINE, Dissertation Abstracts, and The Cochrane Library databases were used for a critical review of the literature in the area of EFM, documentation, and communication. The literature search includes antecedents to fetal monitoring and documentation, interventions preceding electronic fetal monitoring (EFM), documentation, and elements related to documentation and communication.

There are six key themes in the literature regarding EFM. The first theme addresses the history of EFM, where there is a wealth of research data available. The second theme is the correlation between EFM interpretation and neurological deficits. This theme was selected since the original purpose of EFM was to decrease the incidence of neurological deficits seen in newborns. The third theme explores the reliability of EFM. The fourth theme focuses on standards of care for fetal heart rate assessment and includes the latest recommendations from ACOG and AWHONN. The fifth theme looks at the legal liability of FHR assessment, and the sixth theme focuses on communication which includes the documentation process.

History of Electronic Fetal Monitoring

EFM during labor was developed in the late 1960's to detect fetal heart rate (FHR) patterns believed to be indicative of fetal hypoxia (Banta & Thacker, 1979; Grant, 1991; Hefland et al., 1981; Hon, 1958; Kelso et al., 1978; Low, Victory, & Derrick, 1999; McDonald et al., 1985; Sweha, Hacker, & Nuovo, 1998; Vintzileos, Varvarigos, Papas, Sofatzis, & Montgomery, 1993). It was accepted that early recognition of abnormal patterns with timely clinical intervention would prevent fetal death or neonatal neurological compromise (Painter, Depp, & O'Donoghue, 1978). It was also believed that the incidence of neurological abnormalities could be related to the severity of the abnormal fetal heart rate pattern, and thus with timely identification and intervention poor neonatal outcomes could be prevented (Hefland et al.; Krebs, Petres, Dunn, Jordaan & Segreti, 1979; Painter et al.). As a result of these studies, EFM was adopted as a standard of practice. Unfortunately, EFM was implemented before rigorous studies were performed to determine validity and reliability (Freeman, 2002). According to Fleischer et al (1982) "the intrinsic predictive value of abnormal FHR tracing is disappointingly low, mainly because of the large number of false-positive results" (pp. 55-60). However, with consumer expectations, obstetrical liability, and controversy about the efficacy of EFM, intrapartum FHR monitoring continues to be the most common obstetric procedure performed in the United States (Martin et al., 2003).

Between 1975 and 1996, a series of randomized prospective clinical trials were conducted using intermittent auscultation for the control groups and EFM as the experimental intervention. The results did not support the efficacy of continuous fetal monitoring and failed to show significant improvements in outcome for low-risk

pregnancies (Kelso et al., 1978; McDonald et al., 1985; Morrison et al., 1993; Neilson, 1994; Nelson, Dambrosia, Ting, & Grether, 1996). There was minimal benefit with continuous monitoring over intermittent auscultation for the fetus and an increase in cesarean sections from 9% to 12% was seen in the study by Yeh, Diaz and Paul (1982).

In 1988, ACOG suggested that clinical practice change to intermittent auscultation of the FHR at designated times during labor and delivery (ACOG, 1989). However, by this time EFM had become a standard of practice in hospital settings and patients viewed it as part of expected care.

Goodwin (2000) indicates that accelerations and decelerations can be assessed with intermittent auscultation, but pattern identification is difficult. The process of intermittent auscultation is time consuming for the nurse and costly to the hospital. To meet the standards established by ACOG (1989) either EFM during labor or auscultation must be done every 15 minutes for 60 seconds during the first stage of labor, and every five minutes in the second stage. This requires a one to one nurse to patient ratio. According to Morrison, et al. (1993) intermittent auscultation is not suitable for busy labor and delivery rooms. Of the 862 subjects in the study, intermittent auscultation of fetal heart rate was not initiated in 420 subjects because of inadequate nursing staff. Consequentially, continuous EFM was resumed.

More recent studies (Impey et al., 2003; Mires, Williams, & Howie, 2001) found routine use of EFM for 20 minutes on admission did not statistically improve neonatal outcome. The main justification for admission EFM is that the uterine contractions of labor put stress on the placental circulation; an abnormal tracing might indicate a deficiency and hence identify potential fetal compromise at an early enough stage to

allow intervention (Impey et al.). Furthermore, a normal admission electronic FHR tracing offers reassurance. However, the incidence of intrapartum fetal compromise is low in pregnancies that have been uncomplicated before the onset of labor. Thus, labor admission with EFM may represent unnecessary intervention. In such low risk cases, confirmation of a normal FHR by Doppler auscultation should be sufficient (Mires et al.).

Mires et al. (2001) found no significant differences in the incidence of metabolic acidosis or any other abnormal measure of neonatal outcome among women who were identified as low risk when admitted in labor. They did find that women who had admission cardiotocography (external FHR monitoring) were more likely to have continuous FHR monitoring in labor, augmentation of labor, epidural analgesia, and operative delivery than women who received Doppler auscultation.

Hadar and Sheiner (2001) found that abnormal FHR tracing patterns during the first stage of labor did affect perinatal outcome. The presence of abnormal FHR patterns was associated with an abnormal volume of amniotic fluid and meconium-stained amniotic fluid. Newborns with abnormal FHR patterns were more likely to have Apgar scores less than 7 at 1 minute, arterial pH less than 7.2, and base deficit rates 12 mmol/L or greater. Late decelerations and severe variable decelerations were significant factors associated with fetal acidosis. They also found that operative birth rates were higher among patients with abnormal first-stage FHR patterns.

Electronic Fetal Monitoring Interpretation and Neurological Deficits

The primary purpose of EFM is fetal assessment with early recognition of fetal hypoxia (Simpson & Knox, 2000). Initially, it was believed that EFM would decrease the incidence of cerebral palsy. Nelson, et al. (1996) found that FHR patterns were poor

predictors of cerebral palsy, but multiple late decelerations with decreased variability were seen more commonly in fetuses that developed cerebral palsy. Multiple late decelerations were associated with nearly four times the risk of developing cerebral palsy (odds ratio, 3.9; 95% confidence interval, 1.7 to 9.3), and decreased beat-to-beat variability nearly three times the risk (odds ratio, 2.7; 95% confidence interval, 1.1 to 5.8). The researchers concluded by saying that 73% of the children with cerebral palsy did not have multiple late decelerations or decreased beat-to-beat variability and 9.3% of the controls did. They found that only 0.19 percent of singleton infants with birth weights of 2500 grams or more who had multiple late decelerations or decreased variability in heart rate on fetal monitoring developed cerebral palsy. They also found a false positive rate of 99.8 percent, which meant that significantly more women were exposed to surgical interventions if they underwent continuous fetal monitoring in labor (Nelson et al.).

Causation of neurological damage to the infant remains uncertain but as many as 10% of infants who have isolated intrapartum hypoxia later develops cerebral palsy (Freeman, 2002). Other factors that may contribute to poor neonatal outcome with neurological damage include: (a) sudden acute total or near total asphyxia associated with cord or placental insults, (b) survival of a large proportion of very low birth weight neonates, and (c) infection producing fetal inflammatory response and asphyxia damage that occurs before labor onset (Freeman; Grether & Nelson, 1997; Ramin & Gilstrap, 2000). Cerebral palsy has also been associated with coagulation disorders and abnormalities of the placenta (Freeman).

In a randomized controlled trial by Thacker and Stroup (1999), a significant reduction in the incidence of neonatal seizures was found when continuous electronic monitoring was used (relative risk 0.5 and 95% confidence interval 0.30 to 0.82). Vintzileos et al. (1993) reviewed nine randomized control trials with a total of 18,561 patients and identified that EFM was associated with increased rates of surgical intervention (overall cesarean rate 11.2% versus 7.4%; cesarean rate for suspected fetal distress 4.5 versus 1.8%; vacuum assisted for fetal distress 25 versus 12.8%) and decreased neonatal deaths attributed to hypoxia (zero per 1000 versus 3.7 per 1000 births, P= .003 and an odds ratio 0.41 (0.17 to 0.98).

In 1992 ACOG issued a technical bulletin stating that four criteria must be present to link perinatal asphyxia to a neurological deficit in the child. The criteria includes: (a) umbilical artery pH < 7.00, (b) Apgar score of 0-3 for longer than 5 minutes, (c) neonatal neurological sequelae (e.g., seizures, coma, hypotonia), and (d) multiorgan system dysfunction (ACOG, 1992). In 1995, the Task Force on Cerebral Palsy and Neonatal Asphyxia of the Society of Obstetricians and Gynecologists of Canada added additional criteria; umbilical artery base deficit of 16 mm0l/L or more to the list (King & Parer, 2000)

In 2003 the American College of OB GYN convened a task force on Neonatal Encephalopathy and Cerebral Palsy to review scientific data on the topic. The AAP collaborated with ACOG on the task force and co-authored their results (ACOG & AAP, 2003). The report confirms that intrapartum hypoxia is rarely the sole cause of neonatal encephalopathy or cerebral palsy. Less than 25% of infants with neonatal encephalopathy have evidence of hypoxia or ischemia at birth. For a normal fetus during

labor to develop intrapartum asphyxia, leading to neonatal encephalopathy, there would have to be a sentinel event leading to abnormal EFM tracing: (a) prolonged deceleration, (b) repetitive late decelerations, and /or (c) repetitive severe variable decelerations and decreased FHR variability (ACOG & AAP).

Reliability of Electronic Fetal Monitoring

Variations in EFM interpretation, and lack of standardized nomenclatures made outcome evaluation of the fetus very difficult. The use of interpretive terms, such as reassuring, nonreassuring, suspicious, fetal stress, fetal distress created much confusion (Chez, 1997; Cibils, 1996). Studies in the 1980's (Hefland et al., 1981; Lotgering, Wallenburg & Schouten, 1982) identified inconsistencies in interpretation of FHR tracings. The lack of standardized definition of terms made communication, and documentation a problem. There was much concern about interobserver and intraobserver reliability, reproducibility, standardization of nomenclatures and practice patterns based upon the diversity in fetal monitoring interpretation (Chez et al., 1990; Chez & Chez, 1991; Cibils; Hefland et al.).

During the 1980's there were more than 10 studies that identified interobserver and intraobserver reliability as a major problem (Cibils, 1996). Studies (Borgatta, Shrout & Divon, 1988; Donker, Van Geijn & Hasman, 1993) revealed that reproducibility of FHR pattern interpretation between experienced physicians was poor. Borgatta et al. showed inconsistencies in interpretation when the same individual repeated the interpretation at a subsequent time. Donker et al. performed a multinational study with 21 experienced obstetricians reviewing monitor tracing for interpretation and obstetric management. These experienced obstetricians had fair agreement for classification of

accelerations and baseline FHR; poor agreement with baseline variability or identification of the type of deceleration; and poor agreement in clinical assessment of fetal condition and proposals for obstetric management. Beckmann, VanMullem, Beckmann and Broekhuizen (1997) found a positive correlation between length of clinical experience with correct tracing interpretation but not with prediction of Apgar scores or cord blood gas measurements.

Studies (Devoe & McDaniel, 2002; Donker et al., 1993; Grant, 1991) support the concept that visual analysis of FHR tracings are poorly reproducible and interobserver agreement is poor. Clinical observers exhibited different levels of agreement for basic features of the FHR tracing such as rate, variations and events (decelerations). According to Devoe and McDaniel unaided visual analysis of FHR tracings limited reliability and reproducibility. They found that there was a lack of standardized interpretative criteria, observer bias and much variance in observer experience. When clinicians were given a clear set of NICHD guidelines for visually interpreting FHR monitor strips, they were frequently not in agreement: (a) 98.7% of physicians were able to agree on the baseline; (b) 61.8% agreed on accelerations, and (c) 66.5% agreed on decelerations. Ultimately, observer problems lead to inaccurate fetal prognosis and inadequate clinical interventions (Devoe & McDaniel).

According to Cibilis (1996) the inability to asses' fetal wellbeing is a result of two problems: (a) The inability of the practitioner to recognize he had been wrong in his ability to interpret findings correctly, and (b) the length of time and hard work required improving skills in the area. Cibilis contends that intermittent recording of a phenomenon (FHR tracing) can under no circumstance give better information than continuous

monitoring but the problem lies in the evaluation of the findings. To effectively evaluate the fetal status in labor, several factors must be considered which include; gestational age, clinical diagnosis, and maternal medical status.

In response to the lack of agreement in pattern interpretation as well as the high number of false-positive tracings resulting in surgical intervention for delivery, an attempt was made to standardize EFM interpretation (Freeman, 2002; Parer, 1997) and to develop computer software that would interpret FHR rhythms. Other tools were also used to develop standards for interpretation of fetal wellbeing including; (a) fetal scalp blood sampling, (b) fetal scalp stimulation, (c) fetal oxygen saturation monitoring and (d) automated computer analysis of FHR to improve neonatal outcome (Clark, Gimovsky, & Miller, 1984; Devoe et al., 2000; Devoe & McDaniel, 2002; Hiett, Devoe, Youssef, & Black, 1993; Low, Victory, & Derrick, 1999; Murphy, Halamek, Lyell, & Druzin, 2003). Devoe and McDaniel stated that technological advancements as seen with the Oxford System 8000, an expert computer system for intrapartum assessment, provides quantitative analysis of FHR baseline, variation and event recognition which will improve fetal and neonatal outcomes. However, not all institutions have this technology in place nor does the availability of technology ensure adequate or accurate use. With new technological advances, education and up-dates must be provided to users. Computerized teaching tools must be developed and implemented.

Standard of Care for Fetal Heart Rate Assessment

Fetal heart rate assessment and documentation are guided by professional organizations, institutional guidelines, and take into consideration the particular clinical circumstances. Because of the need to improve the reliability of FHR monitoring,

professional organizations developed standards of care and interpretative guidelines to assist care providers with interpretation of fetal heart rate tracings (ACOG, 1989; ACOG, 1995; 1997; 2002; 2005b; AWHONN, 2000; 2005). These guidelines have formalized definitions of the fetal heart rate patterns, and provide protocols for management of abnormal patterns. The initial definitions of FHR patterns came from a research paper in the 1960s (NICHD, 1997). In 1975, ACOG Technical Bulletin No. 32 made recommendations for future research on FHR monitoring. ACOG developed several Bulletins which addressed fetal heart rate patterns: (a) monitoring, (b) interpretation and (c) management; and in 1983 the American College of Obstetricians and Gynecologists established guidelines for perinatal care which were revised in 1997 (ACOG, 1997).

The NICHD Research Planning Workshop, conducted from 1995-1997, provided standardized terms and nomenclature for FHR during labor. The workshop members discussed lack of agreement about FHR pattern interpretation and the need to evaluate the high number of false-positive tracings. They concluded that the following patterns were consistent with hypoxia: (a) late decelerations with absent variability, (b) variable decelerations with absent variability, and (c) sustained bradycardia with absent variability. They also agreed that patterns with the following characteristics have a higher probability of normal oxygenation to the fetus: (a) normal baseline rate, (b) normal (moderate) FHR variability, (c) presence of FHR accelerations, and (d) absence of FHR decelerations. Patterns that met neither of the above criteria were more problematic and the committee recommended utilizing other means of fetal evaluation to confirm oxygenation status. There was no consensus in the research workshop regarding strict guidelines for clinical management using FHR patterns. They recommended that

evidence-based algorithms for management be provided through additional research using computer applications in the interpretation process.

Specific time intervals for FHR monitoring for patients with and without complications were recommended by ACOG (2005a). Ancillary testing for fetal status with fetal pulse oximetry was also discussed. It was recognized that fetal pulse oximetry significantly lowered the cesarean section delivery rate by providing a more accurate reflection of fetal oxygenation, however, ACOG did not encourage using it at this time due to the false reassurance of fetal oxygenation.

ACOG (2005b) continues to support continuous monitoring of FHR during labor even while acknowledging (a) the false-positive rate of EFM for predicting adverse outcomes is high, (b) data shows that the use of EFM increases the likelihood of cesarean birth, and (c) the use of vacuum or forceps operative vaginal births increases when compared with intermittent auscultation. ACOG recognizes advantages to EFM: (a) provides a continuous record of the FHR and uterine activity independent of the medical record, and (b) can be reviewed by multiple care providers both prospectively and retrospectively. Continuous monitoring also provides the opportunity to visually evaluate for changes in fetal status over time. Finally, ACOG recognizes that new, or better defined, assessment tools, in addition to the more sophisticated monitor systems hold much promise for management to prevent intrapartum fetal asphyxia brain damage.

In addition to the above, nurses have other resources that provide guidelines for initial and ongoing assessments of women and their fetus during labor (Feinstien et al., 2003; Mahlmeister, 2000). Some of these resources include: (a) JCAHO's Comprehensive Accreditation Manual for Hospitals, (b) perinatal nursing textbooks, (c)

some state board of health publications, and (d) AWHONN professional organization. In the 1980s the Nurses Association of the American College of Obstetricians and Gynecologists developed areas of nursing practice competence and provided workshops along with video materials and workbooks on EFM (AWHONN, 1993). Guidelines for ongoing labor assessments are described in the Clinical Position Statement Fetal Assessment (AWHONN, 2000).

Legal Liability of Fetal Heart Rate Assessment

According to the ACOG 2006 Survey on Professional Liability (Wilson & Strunk, 2007), obstetricians and gynecologists have an average of 2.62 malpractice claims filed against them during their career, and one in four is sued during residency. Among all specialties, according to the Physician Insurers Association of America, obstetricians and gynecologists have the most number of paid claims and the highest total indemnity.

In a three year period between 1999-2001 ProMutual Group insurance, the largest medical malpractice insurance carrier in the Northeast, paid $70.3 million to obstetrical cases (Greenwald, 2002, 2004). According to Greenwald, plaintiffs won 60% of childbirth negligence cases in 2002, up from 55% in 2001 and 34% in 2000. Between 1999 and 2002, medical malpractice cases accounted for 52% of jury awards of one million dollars or more. Overall, the median award in malpractice cases was $1,010,858 in 2002, up slightly from the $1 million median award reported in 2001 and 2000. Childbirth negligence cases had the highest median jury award in 2002 of all medical malpractice cases with a median award of $2,050,000. The data also showed that, while physicians won the majority of malpractice cases, plaintiffs still won 42% of the time in 2002, up from 40% in 2001. While the 2-percentage-point increase seems slight, it

actually means that plaintiffs won 5% more cases than they did in 2001 (Greenwald, 2004). For every 1,000 deliveries one malpractice claim is brought against a hospital, which poses serious financial burdens, and challenges in the areas of risk management (Bovbjerg, 2005; Condra, 2006).

Malpractice insurance rates for physicians have increased significantly. As a result, physicians have decreased their coverage, which has increased hospital liability to pay large verdicts, and nurses are seeing personal litigation and responsibility to pay damages, when the damages awarded exceed the limits of the insurance policy or when state law caps the liability of a nonprofit agency (Bovbjerg, 2005; Condra, 2006).

Failure to adhere to established guidelines and standards regarding fetal monitoring along with correct interpretation and communication of findings may result in negative neonatal outcomes and place the nurse at risk for nursing negligence (Mahlmeister, 2000). Mahlmeister identified education and competencies in FHR assessment as key elements in malpractice cases. McRae (1999) states that attorney's will test nursing knowledge on fetal monitoring concepts, including terminology, interpretation and nursing interventions for nonreassuring FHR patterns. According to Greenwald and Mondor (2003), perinatal nurses are at higher risk for involvement in malpractice litigation than are any other medical specialty nurses. Failure to perform a timely cesarean delivery was the most common allegation in obstetric claims and the most common sited reason for this was failure to correctly interpret the FHR monitor tracing by the physician and misinterpretation of the monitor strip by the nurse (Graham et al., 2006).

Medical malpractice cases that have claimed negligence resulting in the birth of a neurologically impaired infant routinely pay over one million dollars (Greenwald & Mondor, 2003). A $725,000 litigation award was made for failure of the nurse to properly monitor the fetus during labor (Mahlmeister, 2000). The nurse failed to notify the physician of technical difficulties when assessing the FHR and the actions resulted in a neonatal death.

Many litigation cases hinge upon findings on the EFM tracing. Regardless of whether intermittent auscultation or continuous monitoring is used to assess the FHR during labor, interpretation of the data is often the central focus in malpractice cases when a newborn or child suffers from neurological injury (Mahlmeister, 2000). For perinatal nurses to avoid involvement in litigation, they must be competent in monitoring, communicating, and documenting the FHR during labor and delivery (Greenwald & Mondor, 2003). AWHONN (1998) outlines the essential components of education and skills required of labor and delivery nurses. According to Greenwald and Mondor there is no single way to guarantee competent evaluation of FHR tracings, but ongoing education with regular EFM skill updates, will enhance the knowledge base and reduce hospital liability. Chez (1997) did not find a significant difference between interpretive skills and academic education, clinical experience, or attendance at formal courses. Chez suggest that additional research needs to be done to examine further EFM practice, knowledge and educational methods to define specific strategies for improvement.

Communication and Documentation in the Health Care Setting

Effective nurse physician communication and collaboration is associated with improved patient outcomes (Baggs et al., 1999; Knaus, Draper, Wagner, & Zimmerman,

1986; Simpson et al., 2006) and dysfunctional communication is linked to medication errors (Kohn, Corrigan & Donaldson, 2000), patient injuries (Page, 2004), and patient deaths (Tammelleo, 2001; 2002). When nurse physician collaboration was present patient mortality rates were 41% lower than the predicted number of patient deaths ($p = 0.001$) (Knaus et al.). Hospitals noted for poor communication (little to no collaboration) exceeded their predicted number of patient deaths by 58%. Collaborative relations between nurses and physicians have also been linked to patient and nurse satisfaction, improved decision making, nurse empowerment, and more positive patient outcomes (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Laschinger, Almost, & Tuer-Hodes, 2003).

Two recent publications: *To Err is Human: Building a Safer Health System* (Kohn et al., 2000), and *Keeping Patients Safe: Transforming the Work Environment of Nurses* (Page, 2004) have increased public awareness of patient safety issues and are holding institutions accountable for adverse patient events resulting from ineffective nurse-physician communication. Gitell et al. (2000) found that the frequency of interaction among physicians and nurses was not related to patient outcome but shared goals, shared knowledge, and mutual respect did affect patient outcome. There are several limitations in the current literature on nurse-physician collaboration, primarily related to poor instrumentation (Higgins, 1999), and the inability to generalize beyond the study settings (Higgins; Laschinger et al., 2003).

Most practitioners recognize that FHR monitoring during labor is a multidisciplinary, collaborative process. A shared method for interpreting patterns with an agreed on guideline for management is imperative for a positive fetal and neonatal

outcome (Fox et al., 2000; Simpson, 2005; Simpson et al, 2006; Simpson & Knox, 2000). Simpson and Knox indicate that interpretation and intervention should involve a collaborative perinatal team effort. “Adoption of a common language for FHR pattern interpretation and medical record documentation that is mutually agree on and routinely used by all providers enhances both interdisciplinary communication and patient safety” (Simpson & Knox, 2000, p. 44). Standardized tools enhance teamwork and reduce patient risks (Leonard, Graham, & Bonacum, 2004). Standardized FHR terminology with a common understanding for FHR pattern interpretation based on science and professional standards will enhance patient safety (Simpson et al.). Miscommunication between perinatal team members, especially during telephone conversations, about fetal status, is decreased when the same language is used about EFM data (Simpson & Knox). Simpson et al. found that nurses and physicians generally communicate, and interact favorably with each other. However, communication is minimal, with only two to four conversations, accounting for less than two to four minutes during routine labor. In the presence of nonreassuring FHR patterns, timely and accurate communication is essential (Simpson et al.).

Collaboration is only one key to effective communication. Documentation is the second key. Documentation provides ongoing information about patient status, monitors patient outcomes, and reflects nursing practice. Nursing documentation has been studied and barriers to effective documentation have been noted (Brooks, 1998; Howse & Bailey, 1992; Simpson et al., 2006; Tapp, 1990). Tapp identifies redundant forms and imprecise language as a contributor to poor documentation. Howse and Bailey reports that cognitive and psychosocial factor, are barriers to documentation. Brooks identifies the most

significant barriers to documentation as: (a) charting formats that did not adequately present nurses' interpretation of the care, and (b) lack of nurses' confidence or inability to express clinical judgments and decisions.

According to Berry (1999), documentation in the medical record is the single most important supportive evidence for defense of an allegation of negligent care. If records are complete, legible, and congruent they are assets. In the current legal system it may be many years from event to formal legal inquiry; therefore, medical personnel must rely on written notes in the medical record or electronic data entry. "Documentation is a part of patient care, not apart from it" (Greenwald & Mondor, 2003, p. 105) and poor documentation or lack of documentation can result in presumed poor patient care or lack of care. Documentation ranks second only to patient monitoring and assessment in the area of nursing-related risk exposure, accounting for 20.7% of all exposures (Berry). Documentation deficiencies may result in decreased communication, denied reimbursement by insurance carriers for care rendered, lost information for statistical or outcome data for quality assessment, and in cases of litigation, increased liability exposure for institutions and health care providers (Simpson & Chez, 2001). According to Brunk (2005), if professionals speak the same language in EFM they will be able to effectively communicate.

Summary and Gap in the Literature

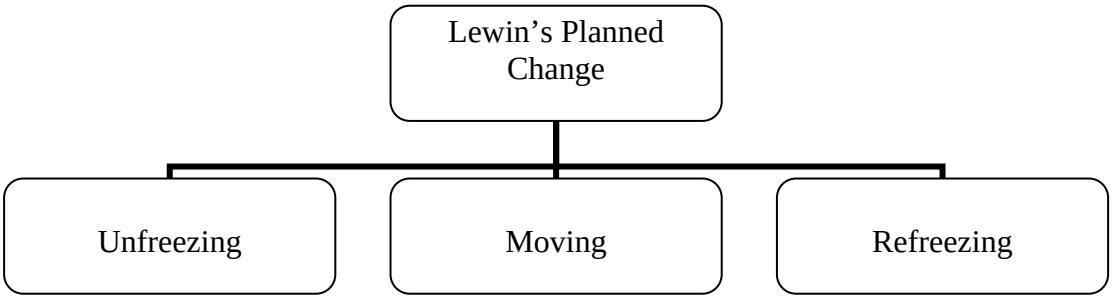
Standardized, structured communication, and care promotes patient safety (JCAHO, 2004; Simpson et al., 2006) and documentation of standardized, evidenced-based care is the best defense against medical malpractice claims (Dunn, Gies, & Perers, 2005). ACOG and AWHONN have developed standards of practice for documentation of

FHR patterns during labor. Failure to follow standards of practice has implications for patient safety during labor. Currently, the gap in the literature is that there is scant research to support that the perinatal team is using standardized terminology during labor. Deviations from use of NICHD terms for FHR documentation during labor could negatively impact perinatal outcomes. Identification of failure to follow NICHD standardized structured communication, a breach in standards of practice, would prompt additional studies to identify: (a) why the problem exists, and (b) interventions to rectify the problem, including but not limited to, changes in EFM competencies, and educational programs. Therefore, this study proposes to determine whether perinatal team members are using NICHD definitions when documenting FHR patterns during labor and if there are differences in FHR documentation between the primary perinatal care provider and the labor and delivery nurse.

Theoretical Framework

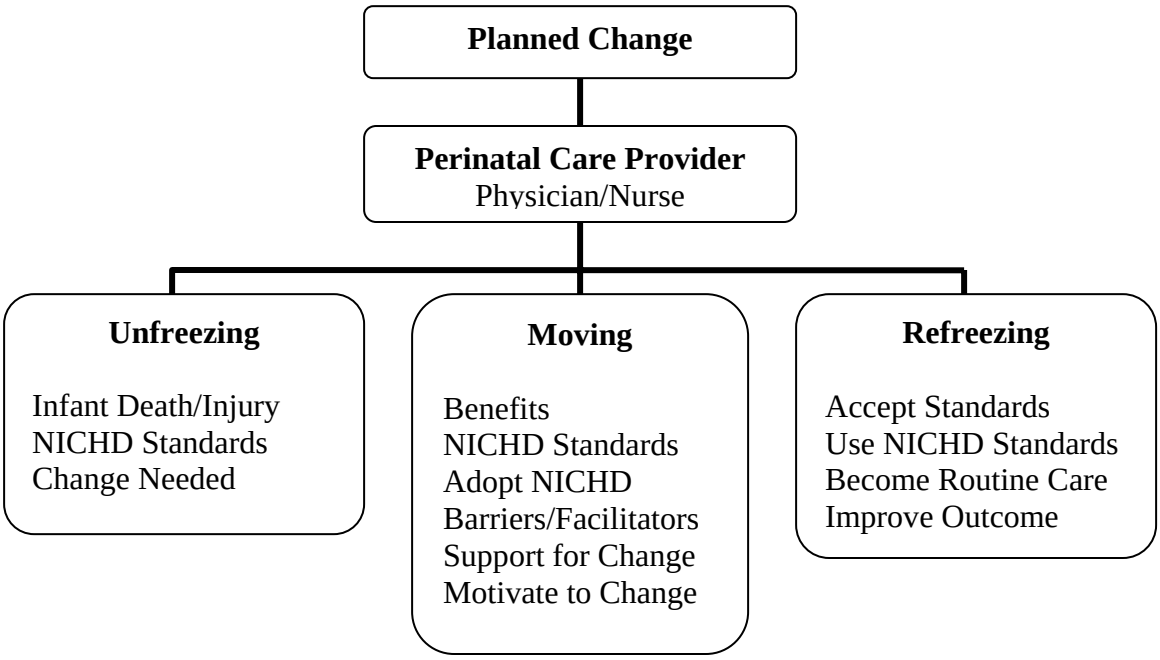
Change is inevitable and a part of everyday clinical practice. Adoption of standardized language for FHR patterns by NICHD prompted a change in previously learned theory, and documentation of FHR. This research study looked to see if the expected change in documentation had occurred in the practice setting. Therefore, Lewin's Change Theory (see Figure 2.1) served as the theoretical framework for this study. The concepts of classic change theory are outlined by Kurt Lewin who identifies three basic stages to planned change (1) unfreezing, (2) moving, and (3) refreezing (Lewin, 1947; 1958).

Figure 2.1 Lewin's Change Theory.



The structure of the framework for this research study is shown in Figure 2.1 The major concepts in the framework are (a) planned change, (b) perinatal care provider, (c) events that lead to unfreezing, (d) forces that promote moving, and (e) refreezing outcomes.

Figure 2.2 Planned Change Framework.



The first stage, unfreezing, involves identifying that a problem, need, or opportunity exists for which some action, change, is needed. It is the stage where the system/institution and individuals need to unfreeze its current method of practice. Identification of the problem and planning for change, including an outline of strategies for change, occurs in the first stage. Lippitt (1973) indicates that active participation in

recognizing problems and brainstorming solutions within a group can assist in the unfreezing stage.

In 2004, JCAHO identified infant death and injury during delivery as a major problem and issued a sentinel event alert. This prompted the adoption of the NICHD FHR standardized language for FHR patterns as standard of practice (ACOG, 2005a; AWHONN, 2005). At the national level the first stage of the change process has been achieved. However, it is at the local level that change must occur to provide improvement in outcome, and avoidance in infant death and injury, as it relates to interpretation and communication of FHR patterns during labor. Therefore, this research study will identify if perinatal team members, in the practice setting, have moved beyond the first stage of the change process.

The second stage of the change process is moving. This is the stage where behavioral changes occur. Lewin (1947) identifies that there are barriers and facilitators to change, and to move through the change process, early and ongoing assessment of the barriers and facilitators is needed. These elements may originate with people, values, or structure. The force of facilitators must exceed the force of barriers for change to be effective (Lewin, 1958). Members working together toward a common goal are more powerful than a single entity and connecting the views of the group to powerful leaders provide more support for the change (Lewin, 1958).

Lewin (1947) identifies the need for a change agent to implement change. There can be more than one agent, and the agent can be from within, internal agent, or outside of the organization, external agent, who has knowledge about the proposed change. Physicians and nurses collaborated in the NICHD workshop where the proposed changes

were defined. They were the experts and powerful leaders who served as the initial change agents. However, change at the local level, clinical practice, will need agents from within, in the hospital setting, to facilitate the change at the clinical practice level. According to Geraci (1997) nurses are ideal candidates to act as change agents.

Lippitt (1973) indicates that the person or organization involved in a change must be motivated to change. The organizational structure must facilitate the change and enhance the participants to change, and resources must be available to initiate a change (Lippitt, 1973). According to Ho et al. (2004), to facilitate change, behaviors must be altered and the stakeholders must be involved in the process. Many initiatives falter because managers, or the organization, neglect to spend time and money, on developing in-service education. Investment in change calls for collateral investment in training. In a structural organizational framework, such as an obstetrical hospital unit, an essential strategy to promote change, involves communicating, realigning, and renegotiating formal patterns and policies (Bolman & Deal, 2003).

Berwick (2003) acknowledges that the most important attribute to change is the perceived benefit of the change. When there is resistance to change individuals align themselves with individuals and resources that have similar beliefs (Rogers, 1995). Berwick indicates that change must be compatible with the values, beliefs, past history and current needs of individuals. Berwick also identifies that a change must resonate with currently felt needs and belief systems. If obstetricians and other members of the perinatal team do not believe there is a problem with the old fetal heart rate terminology they will not adopt the NICHD standardized terms.

The third stage of planned change, refreezing, occurs when the participants in the change process accept and use the new behavior or process (Lewin, 1947). At this stage, change is maintained. According to Rogers (1995) adopters of change, seek reinforcement of their decision to change, through reevaluation and accumulation of additional evidence. This is the same principle as evidenced-based practice. Evidenced based practice is vital to the evolution and renewal of our health care system (Ho et al., 2004). According to Chassin and Galvin (1998) health care professionals must stay informed of the dynamic knowledge explosion, within their area of expertise, to provide safe, quality patient care. Knowledge and use of the standardized terminology for FHR patterns is an essential element of safe and competent care for the laboring patient. It is also a standard of practice. Therefore, the third stage of planned change should be in place, in all labor units, with the use of the NICHD standardized FHR terms as a part of routine practice. This research study will identify if perinatal team members have incorporated this approved standard of practice (ACOG, 2005; AWHONN, 2005).

The health care arena is noted for its slow dissemination of change and diffusion of innovations (Berwick, 2003). Berwick indicates that the rate of change is directly related to the complexity of the proposed change and simple changes spread faster than complicated ones. The use of NICHD standardized terms for FHR patterns during labor is a very simple change on the surface. However, if standardized computer forms are used for documentation of FHR during labor, the change may be more complex, involving development of a new computer program, which would involve more than perinatal team members.

Strengths and Weaknesses of the Theoretical Framework

Lewin's planned change theory is very rational and goal oriented. It is broad focused on planned change and is similar to the nursing process. It includes (a) identification of a problem, (b) assessment, (c) planning, (d) implementation and (e) evaluation and feedback. The major weakness of the model is that it does not include personal factors that can affect change. The human factor can have major consequences in change (Berwick, 2003). Some of the human factors, that could affect utilization of the standardized FHR terminology, include clinical expertise, availability of in-service training, institutional forms, and computer adaptive charting.

Assumptions

The assumptions for this study are based upon the premise that hospitals provide quality health care, and have competent perinatal team members. There are three assumptions identified:

- Electronic fetal monitoring is used during labor and delivery.
- All perinatal team members are trained and competent as indicated by their hospital in electronic fetal monitoring.
- The perinatal team documents fetal heart rate patterns on admission, at least once during labor, and immediately prior to delivery.

Operational Definitions

Following are the operational definitions for this investigation:

Perinatal Care Team

The perinatal care team consists of nurses, nurse midwives, and physicians, who are specially educated, to provide care to the pregnant woman, and fetus. It is their legal

and ethical responsibility, to maintain clinical competences, in monitoring fetal wellbeing. Competence in EFM is a standard of obstetric practice, and hospitals are responsible for, providing basic and continuing education in EFM, validate competency, and monitor practice (Murphy et al., 2003).

Electronic Fetal Monitoring

Electronic fetal monitoring includes an auditory and visual assessment of the FHR. Digital and graphic data is generated, displayed, and a permanent record is obtained (Feinstein et al., 2003).

Reliability and validity will be enhanced by using standardized definitions. The NICHD Research Planning Workshop (1997a,b) recommends the use of standard terminology, to improve agreement in FHR interpretation. AWHONN and ACOG adopted these recommendations in 2005. The NICHD definitions will serve as the operational definitions for this study as represented by Table 2.1. Standard Definitions for FHR Terminology. Utilization of standardized terms will promote validity, and improve the generalizability, of the research findings to other settings or samples. The selection, inclusion criteria, and standardized tool will improve the internal validity.

Links between Framework and Proposed Study

According to Lewin's theory, unfreezing has occurred at the national level with the identification of the problem and adoption of the NICHD FHR standardized language for FHR patterns as standard of practice (ACOG, 2005b; AWHONN, 2005). This research study will identify if perinatal team members, in the practice setting, have moved beyond unfreezing, and moving, to refreezing as evidenced by the use of NICHD FHR standardized language at the local level.

Table 2.1. Standard Definitions for FHR Terminology

Term	Definition
Baseline Rate	Approximate mean FHR rounded to increments of 5 bpm during a 10-minute segment excluding periodic or episodic changes, periods of marked FHR variability, and segments of the baseline that differ by more than 25 bpm
Bradycardia	Baseline FHR < 110 bpm
Tachycardia	Baseline FHR > 160 bpm
Baseline Variability • Absent Variability • Minimal Variability • Moderate Variability • Marked Variability	Fluctuations in the baseline FHR of two cycles/minute or greater. These fluctuations are irregular in amplitude and frequency and are visually quantitated as the amplitude of the peak-to-trough in bpm • Amplitude range undetectable • Amplitude range > undetectable and ≤ 5 bpm • Amplitude range 6-25 bpm • Amplitude range > 25 bpm
Acceleration	Visually apparent *abrupt* increase (onset to peak is < 30 seconds.) in FHR above baseline. The increase is calculated from the most recently determined portion of the baseline. Acme is ≥ 15 bpm above the baseline and lasts ≥ 15 seconds and < 2 minutes from the onset to return to baseline.
Prolonged Acceleration	Acceleration ≥ 2 minutes and < 10 minutes in duration
Early Deceleration	Visually apparent *gradual* decrease (onset to nadir is ≥ 30 seconds) of FHR and return to baseline associated with a uterine contraction. This decrease is calculated from the most recently determined portion of the baseline. It is coincident in timing, with the nadir of deceleration occurring at the same time as the peak of the contraction. In most cases, the onset, nadir, and recovery of the deceleration are coincident with the beginning, peak, and ending of the contraction, respectively
Late Deceleration	Visually apparent *gradual* decrease (onset to nadir ≥ 30 seconds) of the FHR and return to baseline associated with a uterine contraction. This decrease is calculated from the most recently determined portion of the baseline. It is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction. In most cases, the onset, nadir and recovery of the deceleration occur after the onset, peak, and ending of the contraction respectively.
Variable Deceleration	Visually apparent *abrupt* decrease (onset to beginning of nadir is < 30 seconds) in FHR below baseline. The decrease is calculated from the most recently determined portion of the baseline. Decrease is ≥ 15 bpm, lasting ≥ 15 seconds and < 2 min from onset to return to baseline. When variable decelerations are associated with uterine contractions, their onset, depth, and duration vary with successive uterine contractions.
Prolonged Deceleration	Visually apparent decrease in FHR below baseline. The decrease is calculated from the most recently determined portion of the baseline. Decrease is ≥ 15 bpm, lasting ≥ 2 minutes but < 10 minutes from onset to return to baseline.
Reassuring FHR Pattern	A FHR tracing with a baseline rate within normal limits, accelerations, moderate variability, and no late, variable, or prolonged decelerations (Simpson, 2006)
Nonreasuring Pattern	A FHR tracing with characteristics that are persistently abnormal, including tachycardia, bradycardia, minimal or absent variability, and recurrent late, variable, or prolonged decelerations (Simpson, 2006)

From: National Institute of Child Health and Human Development Research Planning Workshop: Electronic fetal heart rate monitoring: Research guidelines for interpretation (NICHD 1997a,b).

CHAPTER 3

Setting and Sample

The purpose of this chapter is to identify the setting and sample characteristics, outline the research design, and procedure, and identify data analysis used in documenting FHR patterns during labor among perinatal team members. The setting for this study included three community hospitals in the Midwest. One site had approximately 75 births per month, another site had approximately 150 births per month and the third site had over 300 births per month. The three hospitals had similar characteristics in that all three were community hospitals with similar nursing staffing patterns and competency requirements. The main difference was case mix of the primary care provider. Two of the hospitals used certified nurse midwives; one used resident staff physicians; and all three used private staff physicians. The distribution of primary care providers was CNM (21.8%), Resident (5%), and MD (73.3%). The labor and delivery nurse, in all 400 charts reviewed, was an RN. All three hospitals used continuous EFM on intrapartal clients.

The FHR documentation by nurses and primary perinatal care providers was compared. Nurses were defined as any labor and delivery nurse that had completed at least a basic FHR monitoring class, and determined as competent in interpreting fetal heart rate patterns by their institution. Primary perinatal care providers were defined as a health care provider either licensed or certified (MD or Certified Nurse Midwife) who performed vaginal births at the hospital facility. Inclusion criteria for this study sample included; women with a singleton pregnancy, greater than 36 weeks gestation, with continuous EFM during labor.

Documentation of nursing competency, in interpreting FHR patterns, was a requirement at all three hospitals. Each hospital required nursing staff to document annual proficiency in interpreting FHR patterns, through workshops, and/or computer generated educational in-services and testing. A tracking method for documenting competency in interpreting FHR patterns was in place at each of the hospitals. One hospital conducted annual workshops for all perinatal team members. None of the hospitals had competency validation requirements for MD's or CNM's. One hospital had not yet introduced the staff to NICHD terminology.

All three hospitals used computer generated nurses' notes; however, as a back up for computer system failure, Hollister standardized notes for paper charting were available. During the month of data collection, 29 of the 400 charts, in this study, used the standardized Briggs Hollister nurses' notes. The footnote key on the Briggs Hollister nurses' notes did not include moderate variability as a choice, which would have caused failure to use the appropriate NICHD term for variability between 5-25 bpm.

Methodology

Research Questions

This study sought to determine if there were differences in documentation of FHR between the primary perinatal provider and the labor and delivery nurse and to determine:

1) Are perinatal team members using the NICHD standardized terminology to document FHR patterns during labor?
2) Are primary perinatal care providers and labor and delivery nurses in agreement when documenting FHR patterns?

Research Design

A descriptive, cross sectional, comparative research design was used to examine documentation of intrapartal FHR patterns in the labor and delivery unit. Cohen's Kappa statistics was used to measure agreement between nurses and primary perinatal care providers in documentation of FHR patterns. According to Polit and Beck (2004) descriptive research should be used to observe, describe, and document aspects of a situation as it occurs naturally. It may be used as a starting point for hypothesis generation. Since there is scant research available on the phenomena of nurse, primary perinatal care provider, and language used in FHR documentation, the data in this study will add to the body of knowledge on documentation.

Comparative research is an effective means of studying agreement (Creswell, 1994; Polit & Beck, 2004). Kappa correlation statistic was used to measure the agreement between the nurses and PCP's in documentation of FHR patterns using NICHD terminology. Kappa values can vary from -1 to +1, with -1 indicating perfect inverse correlation, 0 no correlation, and a +1 perfect positive correlation. The larger the number, the more agreement there is between the two raters. Zero reflects agreement that is no better than chance alone, and a value of 1 represents perfect agreement (Cohen, 1960). The null hypothesis is that the Kappa statistic is 0. In this study a $p < .05$ was considered significant, and the null hypothesis was then rejected. When the null hypothesis was rejected it was concluded that the level of agreement between the two raters was greater than would be expected if the agreement between the two raters was strictly due to chance.

Power Analysis

A power analysis was completed testing the alternate hypothesis that the *phi* correlation between the variables of interest is not zero (null hypothesis that correlation is zero). Since data was obtained at three points in time, on 4 variables, 400 charts were needed to identify correlation between RN and PCP with an alpha of 0.05.

Data Collection

Min et al. (2006) noted that standardized terminologies are increasingly used in health care settings and that auditing these standardized languages is important in detecting errors. An auditing methodology to detect documentation variances was used to examine the relationship between primary care providers and nurse's documentation of FHR patterns during labor.

A retrospective medical records chart review/audit was performed. The birth log on the labor and delivery unit was used to identify charts during the month of July that met inclusion criteria. At the hospital with 75 births per month charts were reviewed from June and July. Births that did not meet the inclusion criteria were not used in the study and the chart was not reviewed. The audit was limited to a maximum of 3 data collection points per chart. The first collection point was the documentation of the FHR closest to admission to the labor and delivery unit, the second point was approximately midway during labor, this was frequently after rupture of the membranes, and the third point was the last FHR assessment entry before birth. Four criteria for the fetal heart rate were assessed: (1) baseline rate, (2) variability, (3) accelerations, and (4) decelerations. Only one person reviewed the charts, the primary investigator, who has EFM education and expertise. The progress notes were reviewed first to identify when the primary perinatal

care provider documented FHR, this time was used as the reference point for recording the nurse's documentation. If there was more than 5 minutes between primary perinatal care provider documentation and the nurse's documentation, the data was not used in the study. When the primary perinatal care provider did not document FHR, then the first documentation, last documentation, and midway point was used for the nurse's documentation. The EFM documentation tool (see Appendix A) was used for recording the findings when collecting the data.

One hundred charts were reviewed from two of the hospitals, and two hundred charts were reviewed at the hospital with over 300 births per month. The use of multiple sites increases generalizability (Polit & Beck, 2004), while similarity in sites, all three hospitals were community hospitals, improves validity. According to the annual survey of hospitals in the United States (Fast Facts on US Hospitals, 2005) 4,936 of the total 5,756 hospitals in the United States are community hospitals.

Instrumentation

One investigator developed instrument, Electronic Fetal Monitoring Documentation Tool (see Appendix B), was used to extrapolate data from the medical record. The documentation instrument is in table format. There are six columns on the instrument, with three extrapolation points: (a) on admission, (b) during labor, and (c) last entry, prior to delivery. The first and third column includes the documented FHR from the chart, by the RN and the Primary Care Provider for: (a) baseline rate, (b) variability, (c) accelerations, and (d) decelerations, at each of the designated extrapolation points. The second and fourth column is coded with a yes or no. Yes, indicating that NICHD terminology was used. No, indicating that NICHD terminology was not used. The fifth

column is coded with a yes or no. Yes, indicating that the RN and Primary Care Provider agree on documentation. No, indicating that the RN and Primary Care Provider did not agree on documentation. The sixth column is also coded with a yes or no. Yes, indicating that the RN and Primary Care Provider agree in concept. No, indicating that the RN and Primary Care Provider did not agree in concept.

Content validity was validated. Three expert labor nurses reviewed the documentation tool. The tool matches the NICHD terms for FHR documentation (See Appendix A). The hospital medical affairs office was consulted, for classification of the primary care provider of record. The labor and delivery nurse manager was consulted for validation of documented clinical competency of nursing staff in EFM as designated by hospital policy.

Data Management and Analysis

The dependent and independent variables are identified and operationally defined. The dependent variable is documentation. The independent variables were the primary care provider and the labor and delivery nurse. Events occurring during the labor process did not affect the study because the documentation was crossed referenced for time of documentation to avoid study bias. A homogenous population was used, thus, further controlling for sampling bias, and avoiding erroneous conclusions. Computer generated charting was used by the nursing staff for all but 29 (N = 400) charts. The computer was down; therefore, Briggs Hollister standardized intrapartal nurses' notes were used. The footnote key on the standardized nurses' notes caused failure to use the NICHD terms for moderate variability. The keyed choices for variability were: "absent," "minimal," "average," and "marked." All but "average" were in alignment with the NICHD

terminology. When coding variability for this study the term “average” was considered moderate variability in the concept column.

There were several charts where the primary care provider documented the FHR using terms such as “good,” “stable,” “reassuring,” and “reactive.” These terms did not have a specific category on the Electronic Fetal Monitoring Documentation Tool, nor were they recognized as appropriate language by NICHD. However, in order to avoid deleting a large amount of informative data, these terms were assigned a NICHD term with similar conceptual meaning for the purpose of this study. For example, if the term “reassuring” was used, it was referenced under baseline and accelerations. A “no” was assigned on the documentation tool in column four (“Primary Care Provider Used NICHD Terminology”) and column five (“RN & Primary Care Provider Agree on Documentation”) if they both did not use the same terminology; however, a “yes” was assigned to column six (“RN & Primary Care Provider Agree in Concept”) if the nurse had documented a baseline that was between 110-160 bpm. Documentation using the term “reactive” FHR was documented under accelerations only. Accelerations using “present” or “15x15” were coded as “yes” in use of NICHD terminology. Accelerations of “10x10” were coded as “no” in use of NICHD terminology; according to NICHD terminology a fetus 37 weeks gestation must have an increase of 15bpm lasting 15 seconds to be termed an acceleration.

FHR documentation using vague terms such as “good” and “stable” were not included in the study. If there was a difference in baseline documentation greater than 10 bpm a “no” was assigned in column five (“RN & Primary Care Provider Agree on

Documentation") with a "yes" assigned in column six ("RN & Primary Care Provider Agree in Concept") if there was no more than a 20 bpm variation.

Statistical analysis was conducted using the SPSS 13.0 statistical package. Descriptive statistics was used to characterize the sample and to address the research questions. The first research question: "Are perinatal team members using the NICHD standardized terminology to document FHR patterns during labor?" was analyzed using statistical analysis including frequency, percentage, cross-tabulation and Kappa analysis at $p < .05$. The second research question: "Are primary perinatal care providers and labor and delivery nurses in agreement when documenting FHR patterns?" was analyzed using frequency, percentage, cross-tabulation, and *chi-square* tests.

Protection of Human Subjects

Permission to undertake this study was obtained from the Institution Review Boards at the University of Missouri-St. Louis, and the community hospitals used in the study (see Appendix B) human subject committee consent forms. This study involved patient chart reviews. An exempt review was obtained since there was no direct human subject contact, subjects were not identified on the collection forms either directly or indirectly, nor were there any means to track or extrapolate patient specific information. Demographic information was obtained for the perinatal team members only, which included their practicing status (primary care provider status vs. nursing staff).

The data collection instrument, Electronic Fetal Monitoring Documentation Tool, for each subject was coded with a number from 1 to 400 and stored in a secure area accessible only by the researcher. There was no individually identifiable health information obtained in the research study, and the investigator can not link data to the

identity of the individuals from whom the data was derived. All retrieved information will be destroyed following the completion of the study. Findings were recorded in group form.

CHAPTER 4

Results

The purpose of this chapter is to discuss results of the study while answering the two research questions: *Research Question 1:* Are perinatal team members using the NICHD standardized terminology to document FHR patterns during labor? R*esearch Question 2:* Are primary perinatal care providers and labor and delivery nurses in agreement when documenting FHR patterns? The findings are addressed using descriptive statistics and statistical analysis.

Demographic Data

A total of 400 charts (N = 400) were reviewed by one investigator. Table 4-1 shows the frequency distribution of type of primary care provider. A total of 293 (73%) are MD's, 20 (5%) resident physicians, and 87 (22%) Certified Nurse Midwives (CNM).

Table 4-1: Type of Primary Care Provider

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**MD**	293	73.3	73.3	73.3
	Resident	20	5.0	5.0	78.3
	CNM	87	21.8	21.8	100.0
	Total	400	100.0	100.0	

Only one chart, out of 400, had no FHR documentation by either the nurse or the primary care provider, the patient delivered within 40 minutes of admission to the hospital. Other precipitous deliveries had at least one FHR documentation entry by the nurse.

Eighty-one of the 400 charts (20%) had no FHR documentation by the primary care provider. Eighty, of the no documentations, were by the MD, and one by the CNM. Of the 81, no documentations, 35 (43%) had risk factors; two were vaginal births after

cesarean (VBAC), 22 were medical induced labor (MIL), and 11 had a cesarean birth for non reassuring FHR pattern. There were 74 charts where the primary care provider used a single term (stable, good, reassuring, or reactive) to describe the FHR pattern. Of the 74 charts 45 (60%) had only one entry during the entire labor process by the PCP.

Results for Research Question One

The area with least use of NICHD terminology to describe FHR patterns was baseline rate (see Table 4-2 and Table 4-3). Table 4-2 reflects the frequency and percent, plus an average percent, for RN use of NICHD terminology to document baseline rate.

Table 4-2: RN use of NICHD Terminology to Document Baseline Rate

	Frequency on admission	Percent on Admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	291	72.8	272	68.0	269	67.3	**69%**
Yes	94	23.5	87	21.8	86	21.5	**22%**
NA	15	3.8	41	10.3	45	11.3	**9%**
Total	400	100.1	400	100.1	400	100.1	**100%**

The nurse did not use NICHD terminology 72.8% on admission, 68% during labor, and 67.3% prior to delivery when documenting baseline rate for an average of 69% of the time. Typically, the nurse reported a baseline range such as; 120-140 bpm or FHR 140's.

The nurse used NICHD terminology to document baseline rate 23.5% on admission, 21.8% during labor, and 21.5% prior to delivery for an average of 22% of the charts. The nurse did not document (NA) baseline rate 3.8% on admission, 10.3% during labor, and 11.3% prior to delivery for an average of 9%. The baseline rate was also the primary care provider's area for lowest use of NICHD terminology at 8%. Table 4-3 reflects the frequency and percent, plus average percent, that the primary care provider (PCP) used NICHD terminology to document baseline rate.

Table 4-3: PCP Use of NICHD Terminology to Document Baseline Rate

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	206	51.5	146	36.5	94	23.5	**37%**
Yes	45	11.3	28	7.0	19	4.8	**8%**
NA	149	37.3	226	56.5	287	71.8	**55%**
Total	400	100.1	400	100.0	400	100.1	**100%**

The PCP did not document (NA) baseline rate 37.3% on admission, 56.5% during labor (including "no documentation" after artificial rupture of the membranes on most of the 56.5%), and 71.8% prior to delivery for an average of 55%.

The accepted NICHD terminology was used most often by the RN and PCP when documenting decelerations. Table 4-4 reflects the frequency and percent, plus average percent, NICHD terminology was used to document decelerations by the RN.

Table 4-4: RN Use of NICHD Terminology to Document Decelerations

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	5	1.3	8	2.0	4	1.0	**1%**
Yes	303	75.8	337	84.3	332	83.0	**81%**
NA	92	23.0	55	13.8	64	16.0	**18%**
Total	400	100.1	400	100.1	400	100.0	**100%**

The RN used NICHD terminology 75.8 %, 84.3%, and 83.0 % respectively for an average of 81% when charting FHR during the intrapartal period. The use of NICHD terminology by the PCP was very similar for decelerations (22%) and accelerations (18%), but like the RN, it was used most often when documenting decelerations.

Table 4-5 reflects the PCP's use of NICHD terminology to document decelerations. The PCP did not use NICHD terminology 4% of the time, used NICHD terminology 22%, and 74% of the time there was no documentation at all for decelerations.

Table 4-5: PCP Use of NICHD Terminology to Document Decelerations

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	12	3.0	18	4.5	23	5.8	**4%**
Yes	91	22.8	92	23.0	80	20.0	**22%**
NA	297	74.3	290	72.5	297	74.3	**74%**
Total	400	100.1	400	100.0	400	100.1	**100%**

Table 4-6 reflects the PCP's use of NICHD terminology to document accelerations. The average was 12% no, 18% yes, and 70% no documentation.

Table 4-6: PCP Use of NICHD Terminology to Document Accelerations

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	71	17.8	52	13.0	23	5.8	**12%**
Yes	88	22.0	70	17.5	62	15.5	**18%**
NA	241	60.2	278	69.5	315	78.8	**70%**
Total	400	100.0	400	100.0	400	100.1	**100%**

Table 4-7 reflects the RN's use of NICHD terminology to document acceleration.

Table 4-7: RN Use of NICHD Terminology to Document Accelerations

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	32	8.0	50	12.5	50	12.5	**11%**
Yes	300	75.0	293	73.2	275	68.8	**72%**
NA	68	17.0	57	14.3	75	18.8	**17%**
Total	400	100.1	400	100.1	400	100.1	**100%**

The RN used NICHD terminology to document accelerations 72% of the time. Ten percent of the 11% failure to use NICHD terminology was for documenting 10x10 accelerations for the term fetus.

FHR documentation was found to be incomplete, with no documentation (NA), in many areas. The area with the highest NA rate was variability. Table 4-8 shows that the

RN failed to document variability 53% of the time on admission, 42.3% during labor, and 42% prior to delivery for an average of 46% during the intrapartal period.

Table 4-8: RN Use of NICHD Terminology to Document Variability

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	111	27.8	156	39.0	157	39.3	**35%**
Yes	77	19.3	75	18.8	75	18.8	**19%**
NA	212	53.0	169	42.3	168	42.0	**46%**
Total	400	100.1	400	100.1	400	100.1	**100%**

Table 4-9 shows that the PCP failed to document variability 69.5% on admission, 73.8% during labor, and 85.8% prior to delivery. The average equaled 76% failure to document (NA) variability during the intrapartal period.

Table 4-9: PCP Use of NICHD Terminology to Document Variability

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
No	106	26.5	91	22.8	50	12.5	**21%**
Yes	16	4.0	14	3.5	7	1.8	**3%**
NA	278	69.5	295	73.8	343	85.8	**76%**
Total	400	100.1	400	100.1	400	100.1	**100%**

Table 4-10 is a combination table that reflects frequency and percent, plus an average percent for failure to document variability by the RN and PCP.

Table 4-10: Failure to Document Variability

	Frequency On admission	Percent On admission	Frequency During Labor	Percent During Labor	Frequency Prior to Delivery	Percent Prior to Delivery	Average Percent
RN	212	53.0	169	42.3	168	42.0	**46%**
PCP	278	69.5	295	73.8	343	85.8	**76%**

Testing Method for Research Question Two

Research question two "Are primary perinatal care providers and labor and delivery nurses in agreement when documenting FHR patterns?" was divided into two sections; agreement in documentation, and agreement in concept. The RN and PCP may not use the exact language to document FHR patterns; however, the concept may be the same. For example, the nurse may document that the FHR has accelerations 15x15 and the PCP may document that the FHR is reactive. The terminology is not the same but the concept is the same, the fetus has a reassuring heart rate pattern. This study was especially interested in agreement in concept, since this could have a major impact on management of the course of labor and birth. Descriptive statistics and Kappa statistics was used to evaluate agreement in documentation. Descriptive statistics and Chi-square was used to describe agreement in concept.

Kappa statistics was used to show the relationship between the RN and PCP in documentation using NICHD terminology. The Kappa statistics reflects those charts where the RN and PCP documented on the same chart at the same point in time.

Agreement in Documentation

Descriptive Statistics

Agreement in documentation between the RN and PCP is first discussed using descriptive statistics. They are presented in a table that shows agreement, between the RN and PCP, on documentation of FHR for all 400 charts. Table 4-11 shows the frequency of agreement (yes), total number of charts (where agreement occurred), and percentage (of agreement), for the three data collection points (on admission, during labor, and prior to delivery) on FHR documentation during the intrapartal period.

The RN and PCP agreed in documentation on baseline rate 41.5%, which is the lowest area of agreement. They agreed 66.9% of the time on documentation of variability. The highest area of agreement was documentation of accelerations at 81.4%. Agreement on documentation for decelerations was 58.7%, with agreement prior to delivery at a low 43%.

Table 4-11 is a summative table that shows percent agreement on documentation of FHR between RN and PCP. Frequency "Yes" indicates number of times (charts) there was agreement in documentation. Total number of charts, indicates the number of charts that both the RN and PCP documented on the specific FHR pattern.

Table 4-11: Percent Agreement on Documentation of FHR between RN and PCP

Documentation of FHR		Frequency "Yes"	Total Number Charts	Percent
Baseline Rate:	On admission	100	239	41.8%
	During labor	66	164	40.2%
	Prior to delivery	45	106	42.5%
	Total:	**211**	**509**	**41.5%**
Variability:	On admission	55	77	71.4%
	During labor	45	69	65.2%
	Prior to delivery	19	32	59.4%
	Total:	**119**	**178**	**66.9%**
Accelerations:	On admission	131	150	87.3%
	During labor	86	109	78.9%
	Prior to delivery	59	80	73.8%
	Total:	**276**	**339**	**81.4%**
Decelerations:	On admission	71	93	76.3%
	During labor	57	100	57.0%
	Prior to delivery	40	93	43.0%
	Total:	**168**	**286**	**58.7%**
TOTAL:		**774**	**1,312**	**59.0%**

Agreement in Documentation on Admission

Table 4-12 is a cross-classification table that shows the relationship between the RN and PCP's documentation of baseline rate on admission using NICHD terminology.

Table 4-12: Relationship between the RN and PCP's Documentation of Baseline Rate on Admission Using NICHD Terminology

			Did the PCP use NICHD terminology to document baseline rate on admission?		Total
			No	Yes	
Did the RN use NICHD terminology to document baseline rate on admission?	No	Count	168	37	205
		% Total	69.1%	15.2%	84.4%
	Yes	Count	30	8	38
		% Total	12.3%	3.3%	15.6%
Total		Count	198	45	243
		% Total	81.5%	18.5%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.028	.066	.438	.662
N of Valid Cases		243			

Neither the RN nor the PCP used NICHD terminology for 168 (69%) of the charts. Both the RN and the PCP used NICHD terminology for only 8 (3%) of the charts, with Kappa = 0.028, p = 0.66. Thus, there was no evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document the baseline rate on admission.

Table 4-13 shows the relationship between the RN and PCP's documentation of variability on admission using NICHD terminology.

Table 4-13: Relationship between the RN and PCP's Documentation of Variability on Admission Using NICHD Terminology

			Did the PCP use NICHD terminology to document variability on admission?		Total
			No	Yes	
Did the RN use NICHD terminology to document variability on admission?	No	Count	47	4	51
		% Total	61.8%	5.3%	67.1%
	Yes	Count	19	6	25
		% Total	25.0%	7.9%	32.9%
Total		Count	66	10	76
		% Total	86.8%	13.2%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.191	.108	1.958	.050
N of Valid Cases		76			

Neither the RN nor the PCP used NICHD terminology for 47 (62%) of the charts. The RN and PCP used NICHD terminology for only 6 (8%) of the charts, Kappa = 0.19, p = 0.050, therefore, no significant evidence suggest the RN and PCP systematically had agreement in their use of NICHD terminology of variability on admission.

Table 4-14 shows the relationship between the RN and PCP's documentation of accelerations on admission using NICHD terminology.

Table 4-14: Relationship between the RN and PCP's Documentation of Accelerations on Admission Using NICHD Terminology

			Did the PCP use NICHD terminology to document accelerations on admission?		
			No	Yes	Total
Did the RN use NICHD terminology to document accelerations on admission?	No	Count	7	0	7
		% of Total	4.6%	.0%	4.6%
	Yes	Count	63	81	144
		% of Total	41.7%	53.6%	95.4%
Total		Count	70	81	151
		% of Total	46.4%	53.6%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.107	.039	2.914	.004
N of Valid Cases		151			

Neither the RN nor the PCP used NICHD terminology for 7 (4.6%) of the charts. Both the RN and the PCP used NICHD terminology for 81 (53.6%) of the charts, Kappa = 0.107, p = 0.004. Thus, there was strong evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology and more than half of the time they used NICHD terminology to document accelerations on admission.

Table 4-15 shows the relationship between the RN and PCP's documentation of decelerations on admission using NICHD terminology.

Table 4-15: Relationship between the RN and PCP's Documentation of Decelerations on Admission Using NICHD Terminology

			Did the PCP use NICHD terminology to document decelerations on admission?		Total
			No	Yes	
Did the RN use NICHD terminology to document decelerations on admission?	No	Count	1	1	2
		% Total	1.1%	1.1%	2.1%
	Yes	Count	11	82	93
		% Total	11.6%	86.3%	97.9%
Total		Count	12	83	95
		% Total	12.6%	87.4%	100.0%

Symmetric Measures					
		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.111	.121	1.608	.108
N of Valid Cases		95			

Neither the RN nor the PCP used NICHD terminology for 1 (1%) of the charts. Both the RN and the PCP used NICHD terminology for 82 (86%) of the charts, Kappa=0.11, p=0.11 on agreement. Thus, there was no evidence to suggest the RN and PCP had agreement in their use of NICHD terminology to document decelerations on admission.

Agreement in Documentation during Labor

Table 4-16 shows the relationship between the RN and PCP's documentation of baseline rate during labor using NICHD terminology.

Table 4-16: Relationship Between the RN and PCP's Documentation of Baseline Rate During Labor Using NICHD Terminology

			Did the PCP use NICHD terminology to document baseline rate during labor?		Total
			No	Yes	
Did the RN use NICHD terminology to document baseline rate during labor?	No	Count	115	18	133
		% of Total	69.3%	10.8%	80.1%
	Yes	Count	25	8	33
		% of Total	15.1%	4.8%	19.9%
Total		Count	140	26	166
		% of Total	84.3%	15.7%	100.0%

Symmetric Measures					
		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.116	.086	1.515	.130
N of Valid Cases		166			

Baseline rate during labor was documented by neither the RN nor PCP using NICHD terminology for 115 (69%) of the charts. Both the RN and the PCP used NICHD terminology for only 8 (5%) of the charts, Kappa = 0.12, p = 0.13, thus, it was concluded

that there was no evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document the baseline rate during labor.

Table 4-17 shows the relationship between the RN and PCP's documentation of variability during labor using NICHD terminology.

Table 4-17: Relationship Between the RN and PCP's Documentation of Variability During Labor Using NICHD Terminology

			Did the PCP use NICHD terminology to document variability during labor?		Total
			No	Yes	
Did the RN use NICHD terminology to document variability during labor?	No	Count	42	4	46
		% of Total	61.8%	5.9%	67.6%
	Yes	Count	15	7	22
		% of Total	22.1%	10.3%	32.4%
Total		Count	57	11	68
		% of Total	83.8%	16.2%	100.0%

Symmetric Measures

		Value	Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.266	.120	2.422	.015
N of Valid Cases		68			

Variability during labor was documented by neither the RN nor the PCP using NICHD terminology for 42 (62%) of the charts. Both the RN and the PCP used NICHD terminology for only 7 (10%) of the charts. The level of agreement was Kappa = 0.27, p = 0.015. Thus, there was strong evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document variability during labor.

Table 4-18 shows the relationship between the RN and PCP's documentation of accelerations during labor.

Table 4-18: Relationship between the RN and PCP's Documentation of Accelerations During Labor Using NICHD Terminology

			Did the PCP use NICHD terminology to document accelerations during labor?		
			No	**Yes**	**Total**
Did the RN use NICHD terminology to document accelerations during labor?	**No**	**Count**	1	0	1
		% of Total	.9%	.0%	.9%
	Yes	**Count**	48	66	114
		% of Total	41.7%	57.4%	99.1%
Total		**Count**	49	66	115
		% of Total	42.6%	57.4%	100.0%

Symmetric Measures

		Value	**Asymp. Std. Error**	**Approx. T**	**Approx. Sig.**
Measure of Agreement	**Kappa**	.023	.023	1.166	.244
N of Valid Cases		115			

Accelerations during labor were documented by neither the RN nor the PCP using NICHD terminology on 1 chart. Both the RN and the PCP used NICHD terminology on 66 charts for 57%. The level of agreement between the RN and PCP was Kappa=.023, p=.244. Thus, it was concluded that there was no evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document accelerations during labor.

Table 4-19 shows the relationship between the RN and PCP's documentation of decelerations during labor.

Table 4-19: Relationship Between the RN and PCP's Documentation of Decelerations During Labor Using NICHD Terminology

			Did the PCP use NICHD terminology to document decelerations during labor?		**Total**
			No	**Yes**	
Did the RN use NICHD terminology to document decelerations during labor?	**No**	**Count**	2	1	3
		% of total	1.9%	1.0%	2.9%
	Yes	**Count**	15	85	100
		% of Total	14.6%	82.5%	97.1%
Total		**Count**	17	86	103
		% of Total	16.5%	83.5%	100.0%

Symmetric Measures

		Value	**Std. Error**	**Approx. T**	**Approx. Sig.**
Measure of Agreement	**Kappa**	.158	.112	2.375	.018
N of Valid Cases		103			

Decelerations during labor was documented by neither the RN nor the PCP using NICHD terminology for 2 (2%) of the charts. Both the RN and the PCP used NICHD terminology for 85 (83%) of the charts. The level of agreement between the RN and PCP was Kappa=0.16, p=0.018. Thus, it was concluded that there was strong evidence to suggest the RN and PCP systematically agreed in their use of NICHD terminology to document decelerations during labor, and the agreement was that both used NICHD terminology.

Agreement in Documentation Prior to Delivery

Table 4-20 shows the relationship between the RN and PCP's documentation of baseline rate prior to delivery.

Table 4-20: Relationship Between the RN and PCP's Documentation of Baseline Rate Prior to Delivery Using NICHD Terminology

			Did the PCP use NICHD terminology to document baseline rate PTD?		Total
			No	Yes	
Did the RN use NICHD terminology to document baseline rate PTD?	No	Count	78	13	91
		% of Total	72.9%	12.1%	85.0%
	Yes	Count	11	5	16
		% of Total	10.3%	4.7%	15.0%
Total		Count	89	18	107
		% of Total	83.2%	16.8%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.161	.114	1.673	.094
N of Valid Cases		107			

Baseline rate prior to delivery was documented by neither the RN nor the PCP using NICHD terminology for 78 (73%) of the charts. Both the RN and the PCP used NICHD terminology for only 5 (5%) of the charts. The level of agreement between the RN and PCP was Kappa=0.16, p=0.094. Thus, it is concluded that there was no evidence to

suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document baseline rate prior to delivery.

Table 4-21 shows the relationship between the RN and PCP's documentation of variability prior to delivery.

Table 4-21: Relationship Between the RN and PCP's Documentation of Variability Prior to Delivery Using NICHD Terminology

			Did the PCP use NICHD terminology to document variability PTD?		Total
			No	Yes	
Did the RN use NICHD terminology to document variability PTD?	No	Count	22	0	22
		% of Total	66.7%	.0%	66.7%
	Yes	Count	8	3	11
		% of Total	24.2%	9.1%	33.3%
Total		Count	30	3	33
		% of Total	90.9%	9.1%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.333	.153	2.569	.010
N of Valid Cases		33			

Variability prior to delivery was documented by neither the RN nor the PCP using NICHD terminology for 22 (66.7%) of the charts. Both the RN and the PCP used NICHD terminology for only 3 (9.1%) of the charts. The level of agreement was Kappa = 0.33, p = 0.010. Thus, there was strong evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document the variability prior to delivery.

Table 4-22 shows the relationship between the RN and PCP's documentation of accelerations prior to delivery.

Table 4-22: Relationship between the RN and PCP's Documentation of Accelerations Prior to Delivery Using NICHD Terminology

			Did the PCP use NICHD terminology to document accelerations prior to delivery?		
			No	Yes	Total
Did the RN use NICHD terminology to document accelerations prior to delivery?	No	Count	2	1	3
		% of Total	2.4%	1.2%	3.7%
	Yes	Count	21	58	79
		% of Total	25.6%	70.7%	96.3%
Total		Count	23	59	82
		% of Total	28.0%	72.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.095	.082	1.517	.129
N of Valid Cases		82			

Accelerations prior to delivery was documented by neither the RN nor the PCP using NICHD terminology for 2 (2.4%) of the charts. Both the RN and the PCP used NICHD terminology for 58 (70.7%) of the charts. The level of agreement between the RN and PCP was Kappa=0.095, p=0.129. Thus, there was no evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document the accelerations prior to delivery.

Table 4-23 shows the relationship between the RN and PCP's documentation of decelerations prior to delivery.

Table 4-23: Relationship between the RN and PCP's Documentation of Decelerations Prior to Delivery Using NICHD Terminology

			Did the PCP use NICHD terminology to document decelerations prior to delivery?		
			No	Yes	Total
Did the RN use NICHD terminology to document decelerations prior to delivery?	No	Count	2	1	3
		% of Total	2.2%	1.1%	3.3%
	Yes	Count	19	70	89
		% of Total	20.7%	76.1%	96.7%
Total		Count	21	71	92
		% of Total	22.8%	77.2%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	.12	.091	1.839	.066
N of Valid Cases		92			

Decelerations prior to delivery was documented by neither the RN nor the PCP using NICHD terminology for 2 (2.2%) of the charts. Both the RN and the PCP used NICHD terminology for 70 (76.1%) of the charts. The level of agreement between the RN and PCP was Kappa = 0.12, p = 0.066. Thus, it was concluded that there was no evidence to suggest the RN and PCP systematically had agreement in their use of NICHD terminology to document the decelerations prior to delivery.

Table 4-24 provides a summary of the previous tables looking at agreement between the RN and PCP in documentation of FHR using NICHD terminology. A "yes" indicates statistically significant, a "ns" indicates not significant. The p level of significance is also listed.

Table 4-24: Summary of Agreement Between RN and PCP in Documentation of FHR Using NICHD Terminology

FHR Pattern		Statistically Significant	Level of Significance
Baseline Rate:			
	On admission	ns	p= 0.66
	During labor	ns	p= 0.130
	Prior to delivery	ns	p= 0.094
Variability:			
	On admission	ns	p= 0.050
	During labor	Yes	p= 0.015
	Prior to delivery	Yes	p= 0.010
Accelerations:			
	On admission	Yes	p= 0.004
	During labor	ns	p= 0.244
	Prior to delivery	ns	p=0.129
Decelerations:			
	On admission	ns	p= 0.11
	During labor	Yes	p= 0.018
	Prior to delivery	ns	p= 0.066

Agreement in Concept

Descriptive Statistics

The percentage of agreement in concept, on documentation of FHR by the RN and PCP is discussed first. A basic table with frequency of agreement (yes), total number of charts, and percent for each data collection point is presented. Table 4-25 summarizes the percent RN and PCP agree in concept on documentation of FHR.

Table 4-25: Percent RN and PCP Agree in Concept on Documentation of FHR

Documentation of FHR		Frequency "Yes"	Total Number Charts	Percent
Baseline Rate:	On admission	183	241	76.0%
	During labor	123	163	75.5%
	Prior to delivery	74	105	70.5%
	Total:	**380**	**509**	**74.7%**
Variability:	On admission	75	77	97.4%
	During labor	62	71	87.3%
	Prior to delivery	26	32	81.3%
	Total:	**163**	**180**	**90.6%**
Accelerations:	On admission	136	148	91.9%
	During labor	95	108	88.0%
	Prior to delivery	66	80	82.5%
	Total:	**297**	**336**	**88.4%**
Decelerations:	On admission	73	93	78.5%
	During labor	63	102	61.8%
	Prior to delivery	48	92	52.2%
	Total:	**184**	**287**	**64.0%**
TOTAL:		**1,024**	**1,312**	**78.0%**

There was agreement in concept 64.0-90.6% when documenting FHR. The lowest area of agreement was documentation of decelerations, at 64%. The area with greatest agreement was documentation of variability, however, this was the area with lowest documentation (180 charts) compared to baseline rate (509 charts).

Agreement in Concept on Admission

FHR assessment (baseline rate, variability, accelerations, and decelerations) was evaluated at each point in time (on admission, during labor and prior to delivery) for agreement in concept in documentation of the FHR between the RN and PCP. The Chi-square test was used to compare agreement in concept between the RN and PCP. The cross-classification table shows the number (and percentage) of charts that the RN and PCP agreed or disagreed in concept, separately for those charts where the RN and PCP agreed or disagreed in documentation.

Table 4-26 shows agreement in concept on documentation of baseline rate on admission.

Table 4-26: Agreement in Concept on Documentation of Baseline Rate on Admission

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	56	82	138
		% within Did the RN and PCP agree on documentation of baseline rate on admission?	40.6%	59.4%	100%
	Yes	Count	0	100	100
		% within Did the RN and PCP agree on documentation of baseline rate on admission?	.0%	100.0%	100%
Total		Count	56	182	238
		%	23.5%	76.5%	100%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.066	1	.000

The number (%) of charts with agreement in concept was 82 (59.4%) versus 100 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's were more likely to agree in concept on the baseline rate on admission when they agreed in the

documentation of the baseline rate on admission compared to when the RN and PCP disagreed in documentation of the baseline rate on admission.

Table 4-27 shows the agreement in concept on documentation of variability on admission.

Table 4-27: Agreement in Concept on Documentation of Variability on Admission

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	2	20	22
		% within Did the RN and PCP agree on documentation of variability on admission?	9.1%	90.9%	100%
	Yes	Count	0	55	55
		% within Did the RN and PCP agree on documentation of variability on admission?	.0%	100.0%	100%
Total		Count	2	75	77
		%	2.6%	97.4%	100%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.133	1	.023

The number (%) of charts with agreement in concept for variability on admission was 20 (90.9%) versus 55 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p = 0.023$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on variability on admission when they agreed in the documentation of variability on admission compared to when the RN and PCP disagreed in documentation of variability on admission.

Table 4-28 shows the agreement in concept on documentation of accelerations on admission.

Table 4-28: Agreement in Concept on Documentation of Accelerations on Admission

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	11	8	19
		% within Did the RN and PCP agree on documentation of accelerations on admission?	57.9%	42.1%	100%
	Yes	Count	1	127	128
		% within Did the RN and PCP agree on documentation of accelerations on admission?	.8%	99.2%	100%
Total		Count	12	135	147
		%	8.2%	91.8%	100%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	71.985	1	.000

The number (%) of charts with agreement in concept for accelerations on admission was 8 (42.1%) versus 127 (99.2%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). There was significant agreement.

Table 4-29 shows the agreement in concept on documentation of decelerations on admission.

Table 4-29: Agreement in Concept on Documentation of Decelerations on Admission

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	20	2	22
		% within Did RN and PCP agree on documentation of decelerations on admission?	90.9%	9.1%	100%
	Yes	Count	0	69	69
		% within Did the RN and PCP agree on documentation of decelerations on admission?	.0%	00.0%	100%
Total		Count	20	71	91
		%	22.0%	78.0%	100%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	80.397	1	.000

The number (%) of charts with agreement in concept for decelerations on admission was 2 (9.1%) versus 69 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on decelerations on admission when they agreed in the documentation of decelerations on admission compared to when the RN and PCP disagreed in documentation of decelerations on admission.

Agreement in Concept during Labor

Table 4-30 shows the agreement in concept on documentation of baseline rate during labor.

Table 4-30: Agreement in Concept on Documentation of Baseline Rate During Labor

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	39	58	97
		% within Did the RN and PCP agree on documentation of baseline rate during labor?	40.2%	59.8%	100.0%
	Yes	Count	1	65	66
		% within Did the RN and PCP agree on documentation of baseline rate during labor?	1.5%	98.5%	100.0%
Total		Count	40	123	163
		%	24.5%	75.5%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.751	1	.000

The number (%) of charts with agreement in concept in baseline rate during labor was 58 (59.8%) versus 65 (98.5%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of baseline rate during labor when they agreed in the documentation of baseline rate on admission compared to when the RN and PCP disagreed in documentation of baseline rate.

Table 4-31 shows the agreement in concept on documentation of variability during labor.

Table 4-31: Agreement in Concept on Documentation of Variability During Labor

			Did the RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	8	16	24
		% within Did RN and PCP agree on documentation of variability during labor?	33.3%	66.7%	100.0%
	Yes	Count	0	45	45
		% within Did RN and PCP agree on documentation of variability during labor?	.0%	100.0%	100.0%
Total		Count	8	61	69
		%	11.6%	88.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.967	1	.000

The number (%) of charts with agreement in concept in variability during labor was 16 (66.7%) versus 45 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of variability during labor when they agreed in the documentation of variability during labor compared to when the RN and PCP disagreed in documentation.

Table 4-32 shows agreement in concept on documentation of accelerations during labor.

Table 4-32: Agreement in Concept on Documentation of Accelerations During Labor

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	13	10	23
		% within Did RN and PCP agree on documentation of accelerations during labor?	56.5%	43.5%	100.0%
	Yes	Count	0	85	85
		% within Did RN and PCP agree on documentation of accelerations during labor?	.0%	100.0%	100.0%
Total		Count	13	95	108
		%	12.0%	88.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	54.618	1	.000

The number (%) of charts with agreement in concept in accelerations was 10 (43.5%) versus 85 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of accelerations during labor when they agreed in the documentation of accelerations during labor compared to when the RN and PCP disagreed in documentation.

Table 4-33 shows agreement in concept on documentation of decelerations during labor.

Table 4-33: Agreement in Concept on Documentation of Decelerations During Labor

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	**No**	**Count**	39	4	43
		% within Did RN and PCP agree on documentation of decelerations during labor?	90.7%	9.3%	100.0%
	Yes	**Count**	0	57	57
		% within Did the RN and PCP agree on documentation of decelerations during labor?	.0%	100.0%	100.0%
Total		**Count**	39	61	100
		%	39.0%	61.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	84.750	1	.000

The number (%) of charts with agreement in concept in decelerations during labor is 4 (9.3%) versus 57 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of

decelerations during labor when they agreed in the documentation of decelerations during labor compared to when the RN and PCP disagreed in documentation

Agreement in Concept prior to Delivery

Table 4-34 shows agreement in concept on documentation of baseline rate prior to delivery (PTD).

Table 4-34: Agreement in Concept on Documentation of Baseline Rate Prior to Delivery

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	31	29	60
		% within Did RN and PCP agree on documentation of baseline rate PTD?	51.7%	48.3%	100.0%
	Yes	Count	0	45	45
		% within Did RN and PCP agree on documentation of baseline rate PTD?	.0%	100.0%	100.0%
Total		Count	31	74	105
		% within Did RN and PCP agree on documentation of baseline rate PTD?	29.5%	70.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.990	1	.000

The number (%) of charts with agreement in concept in baseline rate prior to delivery was 29 (48%) versus 45 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of baseline rate prior to delivery when they agreed in the documentation of baseline rate compared to when the RN and PCP disagreed in documentation

Table 4-35 shows agreement in concept on documentation of variability PTD.

Table 4-35: Agreement in Concept on Documentation of Variability Prior to Delivery

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	6	7	13
		% within Did RN and PCP agree on documentation of variability PTD?	46.2%	53.8%	100.0 %
	Yes	Count	0	19	19
		% within Did RN and PCP agree on documentation of variability PTD?	.0%	100.0%	100.0%
Total		Count	6	26	32
		%	18.8%	81.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.793	1	.001

The number (%) of charts with agreement in concept in variability prior to delivery was 7 (53.8%) versus 19 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively (p=0.001). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of variability prior to delivery when they agreed in the documentation of variability prior to delivery compared to when the RN and PCP disagreed in documentation

Table 4-36 shows agreement in concept on documentation of accelerations PTD.

Table 4-36: Agreement in Concept on Documentation of Accelerations Prior to Delivery

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	No	Count	14	7	21
		% within Did RN and PCP agree on documentation of accelerations PTD?	66.7%	33.3%	100.0%
	Yes	Count	0	59	59
		% within Did RN and PCP agree on documentation of accelerations PTD?	.0%	100.0%	100.0%
Total		Count	14	66	80
		%	17.5%	82.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	47.677	1	.000

The number (%) of charts with agreement in concept for accelerations prior to delivery was 7 (33.3%) versus 59 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$).

Table 4-37 shows agreement in concept on documentation of decelerations PTD.

Table 4-37: Agreement in Concept on Documentation of Decelerations Prior to Delivery

			Did RN and PCP agree in concept?		Total
			No	Yes	
Did RN and PCP agree on documentation?	**No**	**Count**	44	8	52
		% within Did RN and PCP agree on documentation of decelerations PTD?	84.6%	15.4%	100.0%
	Yes	**Count**	0	40	40
		% within Did RN and PCP agree on documentation of decelerations PTD?	.0%	100.0%	100.0%
Total		**Count**	44	48	92
		%	47.8%	52.2%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	64.872	1	.000

The number (%) of charts with agreement in concept for decelerations was 8 (15.4%) versus 40 (100%) for charts where the RN and PCP disagreed versus agreed in documentation, respectively ($p<0.001$). Thus, there was very strong evidence to show that RN's and PCP's are more likely to agree in concept on documentation of decelerations prior to delivery when they agreed in the documentation of decelerations prior to delivery compared to when the RN and PCP disagreed in documentation

Summary

In this study, NICHD terminology was used 51% of the time by the RN to document FHR during the intrapartal period while the PCP used NICHD terminology, on average, only 13% of the time to document FHR. Based upon these findings it is evident that perinatal health care team members are not consistently meeting the criteria established by ACOG and AWHONN for documentation of FHR using NICHD terminology. NICHD terminology was used most often when documenting; decelerations (81%) by the RN, and (22%) by the PCP; and accelerations (72%) by the RN and (18%) by the PCP. NICHD terminology was used least often when documenting; variability (19%) by the RN, and (3%) by the PCP, followed by baseline rate RN (22%), and PCP (8%).

This study identified a large problem with incomplete FHR documentation during the intrapartal period. On average the RN failed to document (NA = 23%) one aspect of the FHR tracing (baseline rate, variability, accelerations, or decelerations) during the intrapartal period. The PCP failed to document (NA = 69%), one aspect of the FHR tracing. Even more disturbing was the finding that 20% of the 400 charts reviewed, had no documentation of FHR by the primary care provider.

The second research question looked at the RN and PCP agreement when documenting FHR patterns. To decrease bias and increase reliability this study looked at three points in time (on admission, during labor, and prior to delivery) for agreement in documentation. The RN and PCP had agreement on documentation of FHR (baseline rate, variability, accelerations, and decelerations) 59%, but agreement in concept 78%. The area with least agreement in documentation was baseline rate (41.5%), then

decelerations (58.7%). When comparing the figures to agreement in concept, the percent improved from 41.5% (baseline rate) to 74.7% (baseline rate). However, agreement in concept for decelerations only improved 5.3%, from 58.7% (in documentation) to 64% (in concept).

There were four areas where the RN and PCP systematically agreed in their use of NICHD terminology: (a) documenting variability during labor ($n = 68$) Kappa = 0.27, $p = 0.015$, (b) documenting variability prior to delivery ($n = 33$) Kappa = 0.33, $p = 0.010$, (c) documenting accelerations on admission ($n = 151$) Kappa = 0.107, $p = 0.004$, and (d) documenting decelerations during labor ($n = 103$) Kappa = 0.16, $p = 0.018$.

When the RN and PCP had agreement in documentation, there was very strong evidence that they would have agreement in concept. The significance level was $p < .05$ at every point in time for every FHR pattern. The significance level was $p < .01$ for all but "agreement on variability on admit" which was still significant ($n = 77$) Chi-Square = 5.133, $p = 0.023$.

Chapter 5

Introduction

In this chapter, the summary of the problem and purpose are presented, along with discussion on results for the research questions. The implications for theory, nursing science and nursing practice, and implications for future studies will also be presented.

Summary of the Problem

Communication, including documentation, has been associated with improved patient outcomes (Baggs et al., 1999; Knaus et al., 1986; Simpson et al., 2006). Documentation in the medical record has been reported as the single most important supportive evidence for defense of an allegation of negligent care (Berry, 1999). Richards and Thomasson (1992) found that inadequate documentation compromised legal defense in approximately one third of obstetric and gynecologic cases.

The primary focus of communication during the intrapartal period is documentation of the FHR. Failure to adhere to established guidelines and standards for EFM, along with correct interpretation and communication of findings, may result in adverse fetal and consequently poor neonatal outcomes, and place the nurse at risk for nursing negligence and legal liability (Mahlmeister, 2000). Documentation using a mutually agreed upon language enhances both interdisciplinary communication and patient safety (Simpson & Knox, 2000). More specifically, standardized NICHD FHR terminology has been shown to enhance communication and patient safety (Simpson et al., 2006).

Summary of Purpose

The purpose of this study was to determine if perinatal team members, nurses and perinatal primary care providers, are using the NICHD standardized terminology to document FHR patterns during labor. This researcher also looked at agreement in documentation of FHR between the RN and PCP. There was no attempt to determine if FHR documentation was accurate or management was appropriate. Identifying actual documentation by the RN and PCP is an important step in improving patient safety and reducing malpractice risks (White et al., 2005).

Discussion of Results for Research Question One

Documentation of FHR

Documentation of FHR is a part of expected practice for the intrapartal client. However, 81 of the 400 charts (20%), in this study, had no FHR documentation by the primary care provider. Of the 81, "no documentations," 35 (43%) had risk factors. The charts of clients undergoing a medical induction of labor had no documentation of fetal status during the induction process. Of the 11 primary cesarean births for "non reassuring FHR" there was no documentation of FHR or fetal status, except on surgical forms under pre and post op diagnosis.

There are no set guidelines established for how frequently the primary care provider should review electronic FHR monitoring; however, ACOG (2005) recommends that the nurses or physicians review the EFM frequently. They also recommend that a patient without complications have the FHR tracing reviewed approximately every 30 minutes in the first stage of labor, and every 15 minutes during the second stage. ACOG also recommends that the health care provider periodically document that they have

reviewed the tracing. According to Frank-Stromborg, Christensen, & Elmhurst documentation is just as important as the care provided. The presumption in the law is that if the care was not documented, it was not done.

Nurses documented more consistently and more completely than the PCP's. Most charts had FHR recorded at least every 30 minutes, most every 15 minutes. One institution (n = 100) documented specific pattern findings (baseline rate, variability, accelerations, and decelerations) every hour with "reviewed strip" documented every 15 minutes between the hourly documentations.

There is limited research studying the use of NICHD terminology for documenting FHR patterns during labor. Some have used the NICHD terminology to review agreement among clinicians on documenting FHR patterns (Devoe et al., 2000; Althaus et al., 2005; Graham et al., 2006). However, none have taken the first step to ensure that all members of the perinatal team are using the same language. The perinatal team is inclusive of the nurse and primary care provider, yet, few studies have incorporated nurses in their studies. Only two studies (Devoe et al., 2000; Devane & Lalor, 2005) were found that included nurses in their studies for determining reliability of EFM interpretations. Devoe included nurses, CNM, resident physicians, and senior physicians. Devane and Lalor looked at inter-rater agreement among midwives.

None of the studies indicated that the perinatal team members were correctly using the NICHD terminology to document FHR patterns. The Devoe study indicated that NICHD terminology templates were provided. The infants in Graham's study were born at 23-34 weeks gestation and tracings were reviewed by perinatologists only. Althaus indicated that NIH guidelines were only used for reactivity. Thus comparison of

this study to other studies is very limited. The terminology may be available but it is presumptuous to assume that perinatal team members are using it correctly.

Documentation of FHR Baseline Rate

Baseline rate was the area documented most often by the RN (91.7%) and PCP (45%) respectively. Yet, it was the area with lowest use of NICHD terminology. The RN did not use NICHD terminology 69.4% and the PCP did not use NICHD terminology 37% of the time when documenting baseline rate. Typically, the nurse reported a range for baseline rate, such as 120-140 bpm, or FHR 140's, rather than a mean FHR rounded to increments of 5 bpm. The computer generated nurses' notes, at one hospital site, where 100 charts were reviewed, required documentation of a lower parameter and upper parameter for baseline rate. The Briggs Hollister paper generated nurses' notes also provided space for lower and upper limits for baseline rate; however, some of the nurses using the notes did document a mean FHR.

The baseline rate on admission was documented the most, by the RN and the PCP for the same charts (n = 243). Yet, NICHD terminology was not used by either the RN or PCP for 168 (69%) of the charts, and both the RN and the PCP used NICHD terminology for only 8 (3%) of the charts on admission. During labor both the RN and PCP used NICHD terminology 8 (5%) of the charts (n = 166), and prior to delivery only 5 (5%) of the charts (n = 107). It appears that the baseline rate is a key area for education in use of NICHD documentation.

Documentation of Variability

Variability is an area of great significance for documentation of fetal well-being. According to the ACOG Practice Bulletin (December, 2005), in most cases, normal FHR

variability provides reassurance about fetal status. Yet, this study found that variability was the area most likely to be omitted from documentation. Nurses failed to document variability (NA) 46% and PCP's (NA) 76% of the time. The other significant finding was that the RN (35%) and the PCP (21%) did not use NICHD terminology when documenting FHR variability. The documentation percent using NICHD terminology for variability was extremely low, RN (19%) and PCP (3%). According to Althaus et al. (2005) decreased short-term variability and increased late decelerations are associated with decreasing umbilical arterial pH and base excess.

Documentation of Accelerations

The presence of FHR accelerations typically ensures that the fetus is not acidemic and provides reassurance of fetal status (ACOG, 2005b). The RN used NICHD terminology 72% when documenting FHR accelerations. The PCP used NICHD terminology 18%, which was significantly less than the RN. Typically, the PCP did not document accelerations (NA = 70%). Ten percent of the "no's" (failure to use) NICHD terminology by the nurse was a result of documenting 10bpm increase in FHR lasting 10seconds as an acceleration, which is classified as an acceleration for the pre-term fetus, not term fetus, by the NICHD standard terminology.

Documentation of Decelerations

The RN used NICHD terminology to document decelerations 81%. The PCP only used NICHD terminology 22% and did not mention decelerations (74%) when documenting FHR. It is uncertain if the PCP was documenting by exception, in which case one would not mention decelerations unless they were present. However, there were times that the RN documented decelerations and the PCP documented "none present"

also some differences in agreement on type of decelerations was noted. This study was not interested in the specific decelerations that were not in agreement.

Both the RN and the PCP used NICHD terminology for the same charts when documenting decelerations; on admission 82 (86%) of the charts (n = 95); during labor 85 (83%) of the charts (n = 103); and prior to delivery 70 (76%) of the charts (n = 92). The RN and the PCP agreed on documentation of decelerations 58.7% and agreed in concept 64%.

Discussion of Results for Research Question Two

Agreement in Documentation of FHR

The reliability of electronic fetal monitoring is estimated by measuring inter-observer agreement. Agreement in documentation between the RN and PCP varied considerably in this study. Percent agreement for the total charts that both the RN and PCP documented, showed that they agreed most often in documentation of accelerations (81.4%), followed by variability (66.9%), then decelerations (58.7%). The RN and PCP showed agreement on documentation of decelerations 76.3% on admission, 57% during labor and 43% prior to delivery for an average of 58.7%. Unlike the findings of Donker, VanGeijn and Hasman (1993) where baseline rate showed fair agreement, the study by Figueras et al. (2005) showed moderate agreement, and Devoe's study, where the level of agreement for baseline rate was the highest (97.3-98.7%); this study found agreement between the RN and PCP in documentation of baseline rate was the lowest (41.5%).

The level of agreement between the RN and PCP's documentation of baseline rate using NICHD terminology was no greater than the level of agreement that would be expected due to random chance on admission; n = 243, Kappa = 0.028, p = 0.66, during

labor; n = 166, Kappa = 0.12, p = 0.13, or prior to delivery; n = 107, Kappa = 0.16, p = 0.094. Thus, it was concluded the RN and PCP did not agree (yes or no) in their use of NICHD terminology and they rarely used NICHD terminology to document the baseline rate.

Even though failure to document variability was relatively high, there was strong evidence that the RN and PCP systematically agreed when documenting variability both during labor, and prior to delivery with a Kappa = 0.27, p = 0.015 and Kappa = 0.33, p = 0.010 respectively. However, it is important to note that the sample size was small n = 68 charts (during labor), and n = 33 charts (prior to delivery) and most of the agreement (62%, during labor; and 67%, prior to delivery) was when the RN and PCP did not use NICHD terminology. When looking at all three points in time (on admission, during labor, and prior to delivery) the RN and PCP had a 66% agreement in documentation of variability, which was the second highest area of agreement in documentation of FHR. These findings were unlike Devane and Lalor where assessment of variability was lowest (Kappa = 0.50), but similar to Figueras' findings of moderate agreement in documentation of normal variability, and unlike Lidegaard et al (1992) where there was low agreement for reduced variability (52%).

The highest percent agreement in documentation of FHR between the RN and PCP was accelerations at 81.4%. This was similar to Figueras' study where there was moderate agreement in documentation of acceleration and Althaus findings (Kappa = 0.53) indicating fair/moderate agreement, but opposite of Devoe's findings where percent agreement was lowest for accelerations (47.2% RN to MD agreement and 61.8% MD Resident to MD agreement).

When evaluating the relationship between the RN and PCP's documentation of accelerations using NICHD terminology there was no significant difference, except on admission. The level of agreement between the RN and PCP was n = 151, Kappa = 0.091, p = 0.007. Thus, there was strong evidence to suggest the RN and PCP agreed in their documentation and both used NICHD terminology 54% (n = 81) when charting accelerations on admission.

Agreement in documentation of decelerations was 58%. This was similar to Devoe's findings of 43.5 % - 66.5%. This was second to the lowest level of agreement for each study. It is also similar to Lidegaard's findings of 55% agreement in late decelerations. This was unlike the findings by Devane and Lalor where inter-rater agreement was highest in classification of decelerations (Kappa = 0.79).

When evaluating the relationship between the RN and PCP's documentation of decelerations using NICHD terminology there was no significant difference on admission; n=95, Kappa=0.11, p=0.11, or prior to delivery; n=92, Kappa=0.12, p=0.066. There was a strong level of agreement, using NICHD terminology, between the RN and PCP for documentation of decelerations during labor n=103, Kappa=0.16, p= 0.018.

Agreement in Concept on Documentation of FHR

Agreement in concept on documentation of FHR between the RN and the PCP was markedly better than agreement on documentation. In concept, agreement occurred most often when documenting variability (90.6%), it was second in documentation agreement (66%); second highest level of agreement in concept was accelerations (88.4%), which was an 81.4% level of agreement in documentation. Agreement in concept for baseline rate was 74.7% compared to 41% in documentation agreement. The

lowest level of agreement in concept was on documentation of decelerations (64%) compared to 58% in documentation.

When looking at all three points in time for all FHR patterns, the average total agreement in concept on documentation of FHR between the RN and PCP was 78%, which was 19% higher than agreement in documentation. Agreement in concept on documentation of FHR decreased over time; from admission thru delivery, for every FHR pattern. The largest decrease in concept agreement over time was in decelerations; agreement on admission 78.5%, during labor 61.8%, and prior to delivery 52.2% for a 26.3 decrease in percent agreement over time.

A cross-tabulation and Chi-square test was done at all three points in time (on admission, during labor, and prior to delivery) on all four FHR criteria (baseline rate, variability, accelerations, and decelerations). A comparison was done on percentage of charts where the RN and PCP agreed in concept, between charts that the RN and PCP disagreed in documentation, versus charts that the RN and PCP agreed in documentation. It was concluded that there was very strong evidence ($p<0.001$) at all points in time, that showed that RN's and PCP's are more likely to agree in concept, when they agree in documentation. The only time p was not < 0.001 was variability on admission ($p = 0.023$); however, this is still less than ($p < 0.05$) significance. Therefore, significance was found for agreement in concept at all points in time for all FHR patterns when there was agreement in documentation.

Implications for Theory

The first stage, unfreezing, involves identifying the problem, awareness of the need for change and creating the motivation or readiness for change. Active participation

in recognizing problems and brainstorming solutions within a group can assist in the unfreezing stage (Lippitt, 1973). In 2004 a problem was identified related to infant death and injury during delivery, which prompted adoption of the NICHD FHR standardized language for FHR patterns. Multiple stakeholders were included in the change process. They moved the national organizations through the process, and standards were established. The first stage of the change process has been achieved at the national level.

The second stage of the change process is moving. This is the stage where behavioral changes occur. It is the time where planning and implementation occurs with problem analysis and seeking of alternative solutions. Lewin (1947) identified barriers and facilitators to change, and stressed that early and ongoing assessment of the barriers and facilitators was needed to move through the change process. However, it is obvious that we have not moved beyond the second stage of the change process at the local level. Perhaps we have not moved beyond the first stage of the change process. This study indicates that we continue to use inappropriate language with insufficient documentation of the FHR during the intrapartal period. Some of the barriers to the change at the local level include standardized nurses' notes that do not use the NICHD terminology, as well as, computer software packages that prompt the use of baseline rate range, rather than an average to the nearest 5 bpm increments. For additional input into the problem and to analyze why the documentation changes have not occurred, additional studies are needed.

Implications for Nursing Science

Clearly, proper documentation is essential to quality patient outcomes. Failure to interpret, communicate, and document FHR accurately and according to standards of practice may result in poor fetal and/or newborn outcomes and contribute to nursing

negligence and legal liability. Insufficient and inconsistent use of NICHD terminology by the RN and PCP is not acceptable practice within the health care community. Incomplete documentation, as found in this study, could have major legal and ethical ramifications. The absence of documentation is still considered absence of care in many arenas, especially the legal arena. Therefore, it is imperative that fetal status during labor be documented according to AWHONN standards of practice.

Documentation and use of the NICHD terminology is also a quality assurance issue. Everyone must be speaking the same language to ensure that standards of care are being met. This is vitally important for the delivery of quality patient care and the attainment of quality patient outcomes. Documentation issues cannot be effectively addressed and resolved without the use of consistent terminology. Additionally, lack of documentation could be important for reasons that are not immediately apparent to the researcher. There needs to be clarification as to the cause of documentation issues, such as; understaffing, knowledge deficit, or lack of resources. Regardless of the cause, all have potential ethical and legal implications. The perinatal team members must work collaboratively to ensure that a documentation tool is developed that meets the standards and promotes effective communication between team members, without being a documentation burden. The documentation tool must also be computer “friendly” and the issue of how often and what descriptors are acceptable for the tool needs to be identified. Administrative nursing leaders must evaluate clinical practice in FHR documentation using the current standards. They must also standardize all intrapartal nurses notes using NICHD terminology and provide ongoing in-service education on EFM and FHR nomenclature. This study was developed to address the gap in the literature on

documentation of FHR during labor using NICHD terminology. This study supports the findings that nurses and perinatal primary care providers are not using standardized language for documentation of FHR during the intrapartal period. It has also identified major omissions in documentation of the FHR during labor. These findings support the need for future research in this area.

Strengths and Limitations of the Study

Strengths

There were several strengths identified in this study. First, a homogenous population was used. Second, documentation was crossed referenced for time. Third, the chart audit was performed by one investigator. Fourth, validity and reliability was increased through a large sample size (N = 400). Fifth, generalizability was enhanced through use of multiple sites; specifically from three community hospitals, in different locations. Sixth, this study was a reflection of current practice. As a result of these strengths; validity, reliability and generalizability were enhanced.

Limitations

There are four limitations identified in this study. First, this study was a prospective, non-randomized study. Second, the data collection tool needed an additional column for documentation of “Reactive” or “Reassuring” FHR pattern which could have provided more specific correlation in documentation between team members. Third, nurses did not use the same nurses’ notes when documenting FHR. Fourth, some of the documentation tools hindered the nurses’ ability to use NICHD terminology.

Recommendations for Future Studies

This researcher recommends a triangulation study with a qualitative element that asks why perinatal team members are not using NICHD terminology to document FHR patterns. The quantitative aspect would identify specific barriers to change; such as, knowledge deficit, inability to access in-service education, and resources. Observational studies may provide information necessary to determine appropriate quality benchmarks for computer generated charting. It would also be interesting to identify team members at greatest risk for failing to use NICHD terminology, and to identify trends, as this study suggests, that documentation agreement in concept decreases as labor progresses.

Future research needs to be done to determine how often and what descriptors are acceptable for FHR documentation. Is documentation using the terms “reassuring” or “reactive” FHR pattern acceptable language? Is it appropriate to document “reviewed strip” every 15 minutes without documenting the specific FHR pattern? This study also raises several standards of practice issues. A standard for frequency of documentation has been established for nursing, but not for other team members; therefore, will nursing documentation alone be sufficient in a litigation event? Is it acceptable that the nurse bears most of the documentation burden for the perinatal team members? Should ACOG define frequency documentation standards for primary care providers? When is it acceptable to document “EFM chart reviewed”? Will computer generated nursing action flow sheets be adequate against litigation claims?

Conclusions

Despite efforts to develop standards and a standardized language, FHR documentation during the intrapartal period remains inadequate. The key finding of this

study was that documentation of FHR using NICHD terminology during the intrapartal period was not meeting established standards of practice. Devoe et al. (2000) found that the use of the standardized guidelines for FHR interpretation failed to reduce interobserver differences for intrapartum electronic FHR recording. This study found that perinatal team members are not using NICHD terminology, and agreement in documentation between the RN and PCP vary significantly. Although there was substantial agreement for variability and accelerations, this was not true for decelerations and baseline rate. This was unlike the findings by Devoe et al. (2000) where the highest level of agreement was baseline rate and the lowest was accelerations and decelerations. Inadequate resources such as: lack of NICHD standardized nurses' notes, and computer software that require a range for baseline rate, may contribute, in part, to inadequate use of NICHD terminology when documenting FHR.

Agreement in concept on documentation of FHR between the RN and the PCP was markedly better than agreement on documentation. In concept, the highest level of agreement was variability, followed by accelerations, then baseline rate, with the lowest agreement for decelerations. The only area of similar findings between this study and the study by Devoe et al. (2000) was that the lowest level for interobserver agreement was documentation of decelerations. Another finding in this study was that agreement in concept on documentation of FHR decreased over time, from admission thru delivery for every FHR pattern.

Finally, the frequency in which there was no documentation of the FHR, especially by the primary perinatal care provider was very alarming. In this study the nurses primarily used computer generated nurses' notes for documentation, and they had

a much higher percent documentation of FHR than the PCP who used paper generated progress notes. These findings are similar to the findings by Tang, LaRosa, & Gorden (1999) where computer-based patient records were more complete than paper records.

This study differs from its predecessors in two main aspects. First, the major focus of this study was to identify if NICHD standardized terminology was used to document FHR. This study did not assume that perinatal team members were using the standardized terms, as did the Devoe study, but looked to see if this was part of the cause of the inconsistencies in documentation. The second difference in this study was that agreement in documentation, as well as, agreement in concept was studied. The focus of numerous studies has evolved around inter-rater reliability among primary care providers, looking only at documentation. Perhaps the primary focus should shift from agreement in documentation to agreement in concept, with inclusion of all members of the perinatal team.

Communication using the same language must be the first step in evaluating fetal status during labor. Since nurses provide the primary documentation of FHR patterns during labor, they must be included in future research to effectively evaluate fetal/newborn outcome.

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Appendix A: EFM Documentation Tool

Electronic Fetal Monitoring Documentation Tool

FHR Terminology	RN Response	**RN Used NICHD Terminology Yes / No**	Primary Care Provider (MD / Resident / CNM) Response	**Primary Care Provider Used NICHD Terminology Yes / No**	**RN & Primary Care Provider Agree on Documentation Yes / No**	RN & Primary Care Provider Agree in Concept Yes / No
On Admission:						
Baseline rate						
Variability						
Accelerations						
Decelerations						
During Labor:						
Baseline rate						
Variability						
Accelerations						
Decelerations						
Prior to Delivery:						
Baseline rate						
Variability						
Accelerations						
Decelerations						

Comments:

Appendix B: Human Subjects Committee Consent Forms

University of Missouri St. Louis

OFFICE OF RESEARCH ADMINISTRATION

Interdepartmental Correspondence

Name: Faye Sigman

Title: A Comparison of Perinatal Care Providers use of the NICHD Standardized Terminology in Documentation of Intrapartal Fetal Heart Rate Patterns

The chairperson of the Human Subjects Committee for UM-St. Louis has reviewed the above mentioned protocol for research involving human subjects and determined that the project qualifies for exemption from full committee review under Title 45 Code of Federal Regulations Part 46.101b. The time period for this approval expires one year from the date listed below. You must notify the Human Subjects Committee in advance of any proposed major changes in your approved protocol, e.g., addition of research sites or research instruments.

You must file an annual report with the committee. This report must indicate the starting date of the project and the number of subjects to date from start of project, or since last annual report, whichever is more recent.

Any consent or assent forms must be signed in duplicate and a copy provided to the subject. The principal investigator must retain the other copy of the signed consent form for at least three years following the completion of the research activity and they must be available for inspection if there is an official review of the UM-St. Louis human subjects research proceedings by the U.S. Department of Health and Human Services Office for Protection from Research Risks.

This action is officially recorded in the minutes of the committee.

Protocol Number	Date	Signature - Chair
070712S	7/19/07	

IRB # 491

Name and description of Protocol: **491 A comparison of Perinatal Care providers us of the NICHD Standardized terminology in documentation of intrapartal fetal heart rate patterns.**
Investigator: Faye Sigmon

Site of Research:

This protocol has been reviewed by the IRB and/or has been expedited according to Federal Regulation.

This protocol is waived from any further review by the IRB unless there is an unexpected problem, such as breach of confidentiality etc.; or changes which may affect the exemption status.

Please contact the IRB office should there be such an event,

5/8/07

Chairman Signature

Date

IRB
AUG 0 8 2007
APPROVED

July 20, 2007

does not have an official Institutional Review Board to process research studies at its institution. Any request is reviewed by the CEO, Director of Risk Management, and in this case OB-GYN Chief of Staff.

Faye Sigman was granted permission by and on July 20th to review 100 charts at

Principal Investigator: Faye Sigman
Study: A Comparison of Perinatal Care Providers use of the NICHD Standardized Terminology in Documentation of Intrapartal Fetal Heart Rate Patterns.
Actions: Approval was given for research study as part of Dissertation
Chart Review Only
100 Charts

Sincerely,

Interim CEO, Chief Nursing Officer

Chief Quality Officer

OB-GYN Chief of Staff

August 14, 2007

To Whom It May Concern:

does not have an official Institutional Review Board to process research studies. Any request is reviewed by the Risk Management Specialist and other leaders as indicated by the specific study.

Faye Sigman was granted permission by RN, Risk Manager and Director of Women's and Infants' Services on August 14, 2007 to review 100 charts at

Principal Investigator: Faye Sigman

Study: A Comparison of Perinatal Care Providers use of the NICHD Standardized Terminology in Documentation of Intrapartal Fetal Heart Rate Patterns.

Actions: Approval was given for a research study as part of Dissertation
Chart Review only
100 charts

Approval granted by:

Risk Management Specialist

Director, Women's and Infants' Services