Ethnicity as a Predictor of Intrapartum Intervention Among Hispanic and Non-Hispanic White Women at a University Hospital

By

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Abstract

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Introduction: Several invasive intrapartum procedures have been developed to assure or maximize both maternal and fetal health outcomes. Although there are clinical situations in which these interventions are clearly indicated, past studies have identified several non-clinical factors, including sociodemographic factors such as race/ethnicity, that are associated with their use. This study examines whether there is a difference between Hispanic and non-Hispanic White (Hispanic and White) women in the use of three intrapartum obstetrical interventions: cesarean section, operative vaginal delivery (forceps/vacuum), and episiotomy.

Methods: This study is a secondary analysis of data from a cross-sectional study of 646 consecutive deliveries at a university hospital conducted over a fourteen-week period. Participating women were interviewed near the time of discharge and a review of medical records followed. Extracted variables included those related to sociodemographics, pregnancy and labor/delivery course, intrapartum operative interventions, and neonatal outcomes. Inclusion criteria included all uninsured English or Spanish speaking Hispanic

and non-Hispanic White women having a singleton delivery. An SPSS database was constructed for analysis and used for all statistical tests.

Results: Data were collected from 646 women, of whom 470 met criteria for inclusion in the analysis (35.7% White and 64.3% Hispanic). Of these women, 84.2% delivered vaginally and 15.8% by cesarean section. Of women delivering vaginally, 6.5% had a forceps/vacuum delivery, and 10.4% received an episiotomy. Whites and Hispanics did not differ significantly in their likelihood of having either a cesarean delivery (16.7% vs 15.2%, P=0.68) or operative vaginal delivery (8.5% vs 5.4%, P=0.24). A higher proportion of Whites had an episiotomy when compared to Hispanics (14.3% vs 8.2%, P=0.06), although not to a level of statistical significance.

Conclusion: This study found no significant difference between Whites and Hispanics in the use of intrapartum interventions. Where apparent racial/ethnic disparities did exist during subgroup analyses, these may explained by an ethnic difference in reproductive patterns (including parity and age) and epidural use.

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Introduction

Interventionist medicine has rapidly penetrated much of medical care, including the field of obstetrics. Several invasive intrapartum procedures have been developed to assure or maximize both maternal and fetal health outcomes. Examples of frequently used intrapartum interventions include induction/augmentation, epidural/spinal analgesia, episiotomy, forceps/vacuum extraction, external and internal fetal monitors, intrauterine pressure monitors, amnioinfusion and cesarean section. Although there are clinical situations in which these interventions are clearly indicated, some studies have identified several non-clinical factors that are associated with their use. For example, researchers have found the likelihood of having cesarean delivery is greater among women who are White, married, privately insured, of advanced age, having higher educational levels, or from Southern states (Taffel, 1994). Additionally, those managed by obstetricians at private hospitals on weekdays (Price and Broomberg, 1990) have an increased risk of cesarean delivery.

Although certified nurse midwives (CNMs) manage women from a variety of socioeconomic, cultural, and geographical backgrounds, they have traditionally served a population largely comprised of minority women and those of lower socioeconomic status (MacDorman and Singh, 1998; Scupholme, DeJoseph, Strobino and Paine, 1992). Because CNMs manage women traditionally underserved by the current health care system, they should be aware of any non-clinical, sociodemographic factors that influence the intrapartum management of their patient population. Identification of non-clinical factors influencing management is the first step in assuring equality within the clinical setting. By examining these factors, CNMs and other health practitioners can

determine if management decisions are grounded in appropriate clinical indication or are influenced by other extraneous variables which may result in discriminatory practice. This study specifically examines the association between a woman's ethnicity and the use of various intrapartum interventions including cesarean delivery, forceps or vacuum-assisted delivery, and episiotomy. A review of the relevant literature regarding the association between race/ethnicity and the use of selected intrapartum interventions is provided in the following section. Additionally, the history and current trends for the use of each of these interventions are provided.

Review of Literature

Ethnicity and intrapartum interventions

In recent decades, epidemiologic studies have been conducted to assess the impact of race/ethnicity on a variety of outcome variables. Traditionally, these studies use "Whites" as a reference group to which other racial groups are compared. Unfortunately, such studies necessarily categorize dissimilar ethnic groups together to fit predetermined racial categories needed for meaningful statistical analysis. Frequently, "race" is subdivided into (a) White and Black, (b) White and Black/Other, or (c) White, Black and Other because of insufficient regional numbers of any one minority other than "Black." Such delineation over simplifies the diverse cultural makeup of the United States population and falsely attributes "non-White" characteristics to a broad range of distinct ethnic groups.

With an enormous influx of Latin-American immigrants over the last two decades, "Hispanics" have replaced "Blacks" as the majority minority (U.S. Bureau of the Census, 1996). This demographic change in the U.S. population has necessitated a

reappraisal of the "race" categorization in epidemiologic work. Within the field of obstetrical research, this transformation has occurred more rapidly than in other fields as Latino women (referred to as Hispanics in this study) have the highest birth rate of any major ethnic group in the United States (U. S. Bureau of the Census, 1996). In fact, in 1990, Hispanics comprised 37.7 % of all California deliveries (Stafford, Sullivan and Gardner, 1993); and by 1995, one out of every six births was of Hispanic origin nationwide (U. S. Bureau of the Census, 1996). It is projected that by the year 2050, one in three births in the United States will be of Hispanic origin (U.S. Bureau of the Census, 1996).

One of the earlier studies to examine U.S. obstetrical trends among a large Hispanic population was conducted by Williams and Hawes in 1979 using information from the 1977 California birth cohort obtained from birth vital records and hospital survey questionnaires. This study found that women with Hispanic surnames were less likely to have a cesarean delivery than women with non-Hispanic surnames. Since this publication, many studies have demonstrated a persistent racial/ethnic disparity in patterns of health care provided to Hispanic and non-Hispanic women. These disparities have been shown to exist in the field of obstetrics in measures as variable as prenatal care access (Ginsberg, 1991) to odds of vaginal birth after cesarean delivery (VBAC) (King and Lahiri, 1994).

With the transformation of "race" into a combined race/ethnicity variable, disagreement has arisen in the literature regarding its appropriate application. Within given subpopulations, race/ethnicity can be highly correlated with variables traditionally used as indicators of socioeconomic status such as educational level, median household

income or insurance status. One of the challenges of any study design is to control for those variables that confound the relationship between the outcome and study variable. For example, in 1992, Zahniser and colleagues conducted an eight year (1980-1987) national review of obstetric procedures sampling over 1.6 million hospital deliveries. They found that women with private insurance were significantly more likely to have a cesarean section, forceps procedure or vacuum extraction procedure than women without private insurance. Although White women were overall more likely than Black and other minority group women to have a cesarean section or forceps procedure, this significant racial disparity did not persist when operative procedures were stratified by insurance category (Zahniser, Kendrick, Franks, and Saftlas, 1992). In other words, race was not associated with these outcomes when race was stratified by insurance status because within the categories of insurance status, no significant difference existed between races for operative procedures. Zahniser concludes that racial differences in rates of obstetrical operative deliveries are a result of racial differences in insurance status. Clearly, any study using race/ethnicity as the primary study variable must attempt to control simultaneously or investigate suspected and known confounders to achieve validity.

Previous studies have identified age, (Gould, Davey, and Stafford, 1989; Placek, Taffel, and Moien, 1983) parity (Gould, et al., 1989) and insurance status (Placek, et al., 1983; Stafford, 1991; Zahniser, et al., 1992; Stafford, Sullivan, and Gardner, 1993; Williams and Hawes, 1979; Placek and Taffel, 1988) as independent predictors of delivery method. Studies examining the association between race/ethnicity and delivery method, however, have been limited in number and equivocal in results. Nonetheless, various studies have noted a relationship between these variables (Irwin, Savitz, Watson

and Andre, 1996; Braveman, Edmonston and Verdon, 1995; Johnson, Lewis and Ansell, 1995; Taffel, 1994; Williams and Hawes, 1979).

In addition to race, previously identified sociodemographic variables associated with an increased use of, specifically, cesarean delivery include: maternal age (Irwin, et al., 1996; Braveman, et al., 1995; Read Prendiville, Dawes, and Stanley, 1994; Taffel, 1994; Zahniser and Kendrick, 1993; Williams and Hawes, 1979), parity (Dougherty and Jones, 1998), height (Read, et al., 1994), marital status (Taffel, 1994), educational level (Braveman, et al., 1995; Taffel, 1994), insurance status (Braveman, et al. 1995; Zahniser and Kendrick, 1993), income level (Gould, Davey, and Stafford, 1989), social status (Leyland, 1993), geographic location (Braveman, et al., 1995; Taffel, 1994; Zahniser and Kendrick, 1993), hospital ownership (Braveman, et al., 1995; Price and Broomberg,1990; Williams and Hawes, 1979), and health provider category (Williams and Hawes, 1979). These studies were generally retrospective in nature using large samples from hospital databases and vital statistics records. Studies were conducted both in the United States and internationally.

Variables demonstrated to be associated with use of forceps and vacuum-assisted delivery include age (Read, et al., 1994; Dougherty and Jones, 1988), parity (Dougherty and Jones, 1988), height (Read, et al., 1994), marital status (Read, et al., 1994), private patient status (Read, et al., 1994) and social status (Leyland, 1993). Two of the three studies addressing the potential relationship between race and vacuum/forceps delivery did not find an association. The third did not specifically look at race as a potential predictor. In this Scottish study (1980-1987), Leyland was not able to collect data on race using the Scottish morbidity records and used the variable of "social status" instead. His

study concluded that the lower a woman's social class, the less likely she is to have forceps and vacuum procedures during delivery.

Finally, parity, race, insurance status, instrument delivery, epidural use, and provider category are associated with an increased use of episiotomy (Hueston, 1996). Hueston's large, retrospective study using regression modeling is one of the only published studies that examines potential sociodemographic variables associated with episiotomy outcome. The current study seeks to control many of these sociodemographic factors by analysis of a large population of uninsured Hispanic and non-Hispanic White women delivering at a university hospital while investigating additional interacting sociodemographic and clinical factors.

History of Intrapartum Intervention Use

Cesarean Section.

Cesarean sections have become the most frequently performed major surgery among women of childbearing age (Taffel, 1994). The use of an abdominal incision for obstetrical delivery dates to the second century A.D. but did not become commonplace until the early 20th century when maternal mortality rates were substantially reduced by the introduction of uterine wall suturing (Cunningham, et al., 1997) and aseptic technique. Between 1965 and 1985, cesarean delivery rates in the United States increased fivefold from 4% to 24% (Centers for Disease Control and Prevention, 1993). By the late 1980s, cesarean section rates stabilized and began to decline yearly from 22.8% in 1989 to 20.7% in 1996 (Curtin, 1997). Internationally, cesarean delivery rates have remained substantially lower than those in the United States. In 1990, the following cesarean delivery rates were reported for various countries: Norway (12.8%), Scotland (14.2%),

Sweden (10.7%), and Canada (20.3%) (Notzon, et al., 1994). Current clinical indications for cesarean deliveries include repeat cesarean, labor dystocia, failure to progress, breech presentation, fetal distress (Cunningham, et al., 1997), and exacerbation of maternal disease or infection.

Forceps Extraction.

The use of forceps to assist in the vaginal delivery of an infant was first recorded in the late 16th century. Since that period, approximately 700 different types of forceps have been developed and modified. To date, only four or five models remain in use (Thompson, 1995). In the 1920's, De Lee advocated the prophylactic use of forceps accompanied by episiotomy. Over the next twenty years, forceps deliveries were reported to occur in as many as 50% of vaginal deliveries (Thompson, 1995). During the 1980s, the incidence of forceps deliveries decreased by 43% to less than 10% (Zahniser et al., 1992). In the 1990s, the rates of forceps deliveries decreased from 5.5% in 1989 to 3.2% in 1996 (Ventura, Martin, Curtin, Mathews, 1998). This declining trend is attributed to (a) a corresponding increase in cesarean deliveries and vacuum extraction (Zahniser, et al., 1992; Yeoman and Gilstrap, 1994), (b) a reduction in the number of U.S. obstetrical residency programs providing training in forceps delivery, and (c) increasing fear of litigation (Yeoman and Gilstrap, 1994). The criteria and indications for forceps use are generally quite narrow. Specific anatomical prerequisites must be met prior to forceps application to the fetal head. Recognized maternal indications for forceps delivery include inability to push, prolonged second stage, medical complications of pregnancy, and coexisting medical complications. Fetal indications for forceps use include failure to progress, arrest of descent, certain malpresentations, and fetal distress (Thompson, 1995).

Vacuum Extraction.

The method of vacuum extraction was first documented during the mid-1800s and introduced in its modern form by Malstrom in 1954 with the metal vacuum cup. The device was soon after modified with plastic cups in order to decrease maternal and fetal morbidity (Williams, 1995). Vacuum extraction promptly replaced forceps use as the preferred method of vaginal operative delivery in many parts of Europe (Williams, 1995; Lucas, 1994). Due to initial high rates of fetal morbidity, the adoption of the vacuum extractor was slower in the U.S. During the 1980s, several studies demonstrated that vacuum-assisted deliveries resulted in less maternal morbidity and similar rates of fetal morbidity as forceps deliveries (Vacca, Gramt, and Wyaatt, 1983; Cunningham, et al, 1997). During this time period, the rates of vacuum-assisted deliveries increased from 0.6 % to 3.3% of all deliveries in the United States. This rise was accompanied by a corresponding decrease in the use of forceps (Zahniser, et al., 1992). As of 1996, vacuum extraction was used in 6.2% of all U.S. deliveries (Ventura, et al., 1998). Prerequisites and indications for vacuum-assisted deliveries are similar to those for forceps deliveries (Lucas, 1994). Currently, the combined forceps and vacuum delivery rate in the United States is 9.4% increasing slightly from 9.0% in the 1980s (Ventura, et al., 1998). Internationally, vaginal operative deliveries vary. Examples include Western Australia, where the operative vaginal delivery rate is 34% (Read, et al., 1994), and Canada with a rate of 48% (Ruderman, Carroll, Read and Murray, 1993).

Episiotomy.

Episiotomy was developed during the 18th to 19th century in Europe but was not advocated in the United States until the early 1900s. During the 20th century, as women

shifted from delivering in homes to hospital settings, the practice of episiotomy became commonplace. In 1938, the medical community defined "indications" for episiotomy (Thacker and Banta, 1983). By 1979, over 62% of all women in the U.S. received an episiotomy during vaginal delivery; among nulliparous women, as many as 50% to 90% received an episiotomy (Thacker and Banta, 1983). In the 1980s, episiotomy rates were not well researched. It is estimated that U.S. rates of episiotomy use remained relatively unchanged from an earlier decade while European episiotomy rates approximated 30% (Lede, Belizan, and Carroli, 1996). Common clinical indications for use of episiotomy include anticipated shoulder dystocia, macrosomia, breech delivery, operative vaginal delivery, posterior position, preterm delivery and anticipated extreme perineal lacerations (Cunningham, et al., 1993).

In summary, this study examines whether there is a difference between Hispanic and non-Hispanic White women in the use of three common intrapartum obstetrical interventions: cesarean delivery, forceps/vacuum-assisted delivery, and episiotomy. As previous researchers have repeatedly identified multiple variables which influence the relationship between ethnicity and various intrapartum interventions, this study attempts to investigate many of these sociodemographic factors by analyzing a large population of uninsured Hispanic and non-Hispanic White women having singleton births at a university hospital. Consequently, groups will be similar regarding insurance status, hospital ownership, and geographic location. Other sociodemographic and clinical factors such as maternal age, education, parity, maternal height, infant birth weight, infant gestational age, use of epidural analgesia, and provider category will also be investigated.

Research Question

Is there a difference between Hispanic and Non-Hispanic White women in the use of selected obstetrical interventions?

Methods

Design

This study is a secondary analysis of data collected previously for a larger study at the same hospital. The original study was cross-sectional in nature and collected data from 646 consecutive deliveries attended by a variety of providers (obstetricians, family practice physicians, and CNMs) over a fourteen-week period at a large university hospital. Those women consenting to participate were interviewed near the time of discharge and a review of the medical records related to their most recent pregnancy followed. No follow-up was attempted. The in-hospital interview format was chosen to isolate a study population difficult to sample adequately in other settings and for which follow-up is often difficult. A standardized data collection form (Appendices A and B) was developed to ensure completeness in assessment and to minimize collection bias. The use of the data collection tool for this study was approved by The Institutional Review Board and Human Subjects Committee of The Oregon Health Sciences University. Initially, participants' names were included in the data collection process to avoid duplication or omission of women from the study but identifying markers were later removed.

Variables

Study variables were identified through an extensive review of the relevant obstetrical and epidemiologic literature. The study variable, race/ethnicity, was identified

individually by the subject at the time of interview. The subject chose one of the following categories: White, Black, Hispanic, Asian, or Other (See Appendix A). For analysis purposes, all subjects from Latin-American countries and those identifying themselves as Hispanic were classified as "Hispanic." All Hispanic subjects in this study population were considered to be "White Hispanics" as the prevalence of Black Hispanics in this population was at, or near, zero. Furthermore, the majority of Hispanics who delivered at this hospital were of Mexican heritage. The "White" racial/ethnic grouping included all persons of non-Hispanic Caucasian race born or reared principally in the United States, Canada, or Western Europe. All women from Russia or Ukraine were excluded prior to analysis due to a higher level of parity not found to be consistent with that of White women from other European countries and the United States. Participants of mixed racial/ethnic background were asked to identify the group with which they most closely identified themselves. Only subjects categorized as "White" or "Hispanic" were included in the analysis portion of this study.

The outcome variables, cesarean delivery, forceps/vacuum-assisted delivery and episiotomy were identified through direct review of the individual hospital birth records. These interventions were assumed to be listed accurately and, in most cases, were recorded directly from the provider's notes. The data collection instrument (Appendix B) permitted the coding of multiple intrapartum interventions allowing individual subjects to have coded all of the potential outcome variables of interest. During the analysis portion of this study, each intervention was counted singly allowing the coding of more interventions than the number of subjects receiving those interventions.

Other variables were collected using a standardized form (See Appendices A and B) from the larger obstetrical study. This data collection instrument included an extensive review of sociodemographic data, antenatal and intrapartum course, and fetal outcome variables. These additional variables were selected for study based on a review of literature indicating previously identified associations. The following variables were included in the initial data collection and were analyzed in this study as potential confounders: maternal age, parity, maternal height, marital status, maternal years of education, infant gestational age, infant birth weight, use of epidural analgesia, and provider type.

Sample

All English and Spanish-speaking women delivering at the chosen university hospital during the data collection period were invited to participate in the initial 14-week study. Two percent of women refused participation in the study and four percent spoke a language other than English or Spanish and could not be interviewed. Prior to initiation of the study, the population of women delivering at this hospital was known to be comprised of approximately 42% Hispanics, 5% Blacks, and less than 50% non-Hispanic Whites (including Russian/Ukrainian women). Women delivering at the hospital generally range in age from 14-45, with relatively few women falling outside of this age range. The chosen university hospital is a major referral center for patients of Hispanic origin and also serves as a site of medical care for uninsured patients. Approximately 16% of women delivering at the hospital have private insurance and the remainder are either uninsured or receive some type of public assistance to pay for medical care (Personal communication, Richard Lowensohn, April 1998). All non-privately insured

Hispanic and non-Hispanic White women having a singleton delivery with a gestational age of twenty weeks or greater were included in the analysis portion of this study.

Data Collection

All deliveries occurring between June 15, 1998 and September 18, 1998 were reviewed using information from (a) a medical chart review, (b) a financial summary, (c) an in-hospital patient interview, and (d) the labor and delivery log. Rationale for using each source of information is listed below:

1. The Hospital Chart provided pertinent information regarding pregnancy course, labor and delivery course, complications, and operative interventions.

2. The Financial Cover Sheet provided general demographic and insurance information on all women.

3. In-Hospital Patient Interviews (5-10 minutes in length) provided information not uniformly collected by the hospital such as indicators of socioeconomic status. All interviews were conducted in either English or Spanish by experienced interpreters using the standardized form.

4. Labor and Delivery Log: This log documents the patient's prenatal care provider/institution, labor management provider, and delivery provider.

Analysis

Over the course of the study, an SPSS database (Windows Version 6.1, SPSS Inc., Chicago, IL) was constructed for analysis. This statistics package was used for all statistical tests. The data set was approached in a systematic fashion, beginning with a descriptive analysis of the distribution of each of the study variables within groups of Hispanic and non-Hispanic White participants. Bivariate analysis included a comparison

of the distribution of the outcome variables within demographic subgroups (age, parity, level of education, etc.) to determine those factors associated with each of the outcomes. Finally, a stratified bivariate analysis (chi-square and Fisher's-exact test when appropriate) was utilized to characterize, more fully, those factors found to be associated with each of the outcome variables.

Results

Intrapartum Interventions

Data were collected from 646 women, of whom 470 met criteria for inclusion in this analysis by being an uninsured woman of a non-Hispanic White (n=168) or Hispanic (n=302) background and having a singleton delivery of greater than 20 weeks gestation. Regarding the principal outcomes variables, 84.2% of women delivered vaginally (5.3% VBAC) and 15.8% by cesarean section (9.6% primary and 6.2% secondary). Of women delivering vaginally, 6.5% had a forceps or vacuum-assisted delivery and 10.4% received an episiotomy (Table I).

Sample Characteristics

With regard to patient demographics, participants' ages ranged from 14 to 45 years with 19.0% being younger than age 20 and 7.0% being older than age 34. Maternal education ranged from zero to 21 years with 64.1% of the sample reporting 11 years or less. Fifty-two (51.8%) percent of women were single. Seventy-one percent of women were managed by obstetricians/obstetric residents, 20.9% by certified nurse midwives, and 7.8% by family practice physicians/family practice residents. Among women delivering vaginally, 50.8% had an epidural. All women included in this analysis were either uninsured or were recipients of public assistance. Forty-one percent of women

were nulliparous and gestational ages ranged from 23 to 42 weeks, with 10.7% of deliveries occurring before 37 weeks gestation and 17.7% at 41 weeks or greater (Tables II and III).

Whites and Hispanics (35.7% vs 64.3%) differed significantly in both age and education, with Hispanics, in general, being younger ($P<0.01$) and less educated ($P<0.001$). They did not differ significantly with regard to marital status (Table IV). The two study groups differed with regard to health care provider. Whites and Hispanics had a similar propensity to be managed by an obstetrician (66.7% vs 74.0%). Of the remainder, Whites were more likely to be managed by a family practice physician (17.3% vs 2.4%) while Hispanics were more likely to be managed by a certified nurse midwife (16.1% vs 23.6%, $P<0.001$ for difference between study groups). White women were also more likely than Hispanic women to receive epidural analgesia during labor (60.0% vs 45.7%, $P<0.01$). White and Hispanic infants differed significantly with regard to their estimated gestational age with White infants more likely to be preterm (15.1% vs 8.2%) and Hispanic infants more likely to be post-term (14.5% vs 19.5%, $P=0.05$ for difference between groups). Whites and Hispanics were also found to differ in stature with Hispanic women more likely to be less than 62 inches in height (9.2% vs 43.1%) ($P<0.001$). The two groups did not differ significantly in parity, infant birth weight, and infant gender (Table V).

Ethnicity and Intrapartum Intervention

Whites and Hispanics did not differ significantly in their likelihood of having either a cesarean delivery (16.7% vs 15.2%, $P=0.68$) or operative vaginal delivery (8.5% vs 5.4%, $P=0.24$). A higher proportion of Whites had an episiotomy when compared to

Hispanics (14.3% vs 8.2%, P=0.06), although the difference was not statistically significant (Table VI).

Ethnicity and Cesarean Section

Whites and Hispanics were not found to differ statistically in overall likelihood of cesarean section when the analyses were stratified by maternal age, education, parity, height, infant gestational age or health care provider (Tables VII and VIII). Additionally, they did not differ in overall likelihood of having a primary (Tables IX and X) or secondary (Tables XI and XII) cesarean section.

Ethnicity and Primary Cesarean Section

Among women at risk (having no prior history of cesarean section) for having a primary cesarean section, Whites and Hispanics differed in their likelihood of having a cesarean section only within one narrowly defined age group (Table IX). Among women ages 25 to 34, Whites were more likely to have a primary cesarean section than Hispanics (18.8% vs 5.8%, P<0.01). Percentages of primary cesarean section were equivalent for nulliparous women in each group (17.8% vs 17.7%, P=0.98). Overall, percentages of primary cesarean section were similar between Whites and Hispanics for each level of the analyzed covariates.

Ethnicity and Forceps/Vacuum-Assisted Deliveries

Although the two study groups did not differ in their overall likelihood of having an operative vaginal delivery (8.5% vs 5.4%, P=0.24), among nulliparous women, a significantly higher percentage of Whites than Hispanics had a forceps or vacuum-assisted delivery (18.0% vs 6.3%, P=0.02). There was no difference found among multiparous women. Though not statistically significant, among patients managed by

obstetricians, Whites had a higher proportion of vaginal operative deliveries than Hispanics (9.2% vs 3.9%, P=0.08). This difference between groups did not exist among women managed by certified nurse midwives or family practice physicians. Whites and Hispanics did not differ in operative vaginal delivery rates when analyses were stratified by age, education, height, gestational age and epidural analgesia (Tables XIII and XIV).

Ethnicity and Episiotomy

A somewhat higher proportion of Whites than Hispanics had an episiotomy (14.3% vs 8.2%, P=0.06). The direction of this difference was found for all levels of parity, gestational age, provider, maternal height and use of an epidural, though these differences did not reach a level of statistical significance. Whites and Hispanics had similar proportions of episiotomy among younger and less educated age groups, but a disparity developed among older and more educated women, Whites being more likely to have an episiotomy. Among women 25 to 34 years, Whites were more likely to receive an episiotomy than Hispanics (14.5% vs 3.7%, P=0.02) (Tables XV and XVI). However, this age category included only twelve women (eight Whites and four Hispanics) who received an episiotomy.

Ethnicity and Epidural

Although intrapartum use of epidural analgesia was not a primary study variable, it should be noted that Whites and Hispanics differed significantly in their overall likelihood of receiving this intervention (60.0% vs 45.7%, P<0.01). Additionally, a somewhat higher proportion of Whites than Hispanics received epidural analgesia for all levels of subgroup analysis including age, education, parity, height, infant gestational age, and provider type (Tables XVII and XVIII). These trends, however, were not

statistically significant. Use of epidural analgesia decreased with increasing age among Hispanic women.

Discussion

As Hispanics are the fastest growing major ethnic group in the United States, it is critical that health care providers become familiar with the demographics, health behaviors, and health outcomes of this childbearing population. Additionally, systematic variability in the provision of health care to this group must be recognized to assure appropriate management equivalent to that received by other ethnic and racial groups. Information on race (including Hispanic origin), method of delivery and other maternal and infant-related factors has been routinely collected on the U.S. Standard Certificate of Live Birth only since 1989 (Mathews, Ventura, Curtin, and Martin, 1998; Taffel, 1994). Such information not only allows researchers to depict the demographic makeup of a previously inaccessible population, but it enables the identification of national and regional patterns of obstetrical management and maternal/infant outcomes specific to the Hispanic population.

Various studies have used birth certificate and similarly collected data to examine the relationship between ethnicity and obstetrical intervention. As stated previously, these results have been equivocal. An important limitation to research comparing racial or ethnic groups is an underlying inability to account for an array of racial or ethnically dependent confounders such as socioeconomic status, education, age, provider type and pregnancy related comorbidities. This study sought primarily to control for socioeconomic status by including only women without private insurance. All analyses were then stratified by the other potential confounders, but no effort was made to

examine potential interactions between confounders (i.e. younger women are more likely to be unmarried and have less education). In spite of this limitation, potential patterns in management difference were recognized.

In this study, no significant differences were found between Whites and Hispanics in the likelihood of overall cesarean delivery, primary cesarean delivery, secondary cesarean delivery, forceps/vacuum-assisted deliveries, or episiotomy. In spite of these findings, a somewhat higher proportion of Whites did receive forceps/vacuum-assisted delivery, and episiotomy. Interestingly, a significantly higher proportion of Whites received epidural analgesia when compared to Hispanics. Upon stratified analysis, some disparity between groups persisted for both episiotomy and epidural use, but not for forceps/vacuum-assisted deliveries. Given the small sample size in this study, such findings, though non-significant, may indicate trends for White-Hispanic variability in intrapartum management that require further consideration.

Overall and Primary Cesarean Section

Whites and Hispanics did not differ significantly in rates of overall and primary cesarean delivery. A slightly higher percentage of Whites in this study had a cesarean section (primary and secondary) when compared to Hispanics (16.7% vs 15.2%). This compares to a national White/Hispanic rate of 20.8% and 20.0% (Ventura, et al., 1998). Among women at risk for primary cesarean section, a higher percentage of Whites in this study had this intervention than their Hispanic counterparts (12.9% and 9.6%). This compares to a 14.8% and 13.4% White/Hispanic difference on a national level (Ventura, et al., 1998). These reported national rates, however, are unadjusted and do not account for potential ethnic differences in other confounding factors such as age, parity, and

insurance status. It is also interesting to note that, although some studies have shown an ethnic difference in cesarean section rates, these findings are not supported by data from this study or by national data.

Maternal Age.

White women in the 25 to 34 year age group were at a significantly greater risk than Hispanic women in this age group for a primary cesarean section. A contribution to these findings may be the ethnic disparity in parity seen at these ages. White women within this age group were more likely than the corresponding Hispanic women to be nulliparous (28.4% vs 14.4%, P=0.02). Consequently, Hispanic women in this age group were more likely to have had a previous successful trial of labor, reducing their risk of cesarean section. In this sample, White women tend to become pregnant for the first time at an older age, thus placing them at an increased risk, compared to Hispanic women, of undergoing a cesarean section at an older age.

VBAC and Secondary Cesarean Section.

Past studies have found that ethnicity is an independent predictor of VBAC (King and Lahiri, 1994; Stafford, 1991), Whites being more likely than other ethnic groups to have this delivery type. The current study, however, does not support these previous findings. Interestingly, in 1996, the national rates of VBAC among White and Hispanic women were lower (29.5% and 24.8%) (Curtin, 1997) than those found in this study (38.5% and 48.8%).

In a study evaluating the accuracy of delivery method documentation on birth certificates, Green and colleagues (1998) found that VBAC rates were highly underestimated. In 1989-1992, only 42% of women having a VBAC were correctly

documented on the birth certificate, and only 79% of women with a history of a primary cesarean section were identified as having had a cesarean section. Similarly, the researchers in the current study cannot verify whether the number of women having VBACs and repeat cesarean sections were coded correctly. In the current study, information on delivery method was taken from delivery records. Consequently, data collectors relied upon, and were limited to, the information documented by previous providers. Because "VBACs" are also "vaginal deliveries," providers may have under-documented the incidence of VBAC. This potential documentation error may falsely decrease the rate of VBACs and increase the relative rate of repeat cesarean deliveries.

Maternal Education.

King and colleagues (1994) additionally found the likelihood of VBAC to increase with increasing years of maternal education. The current study found a similar educational trend among Whites but, among Hispanic women, the pattern was reversed. As years of education increased among Hispanics, the rate of repeat cesarean section tended to increase. McClain hypothesized that higher repeat cesarean section rates among minority women may be due to less frequent counseling and encouragement to attempt a trial of labor when compared to VBAC counseling given to White women (1994). Furthermore, the lower rate of VBAC among this small group of educated Hispanic women may be due, in part, to cultural expectation and knowledge of medical standards of practice, as many Latin American hospitals maintain the policy of "once a cesarean, always a cesarean," thus biasing women towards this cultural norm.

Forceps and Vacuum Delivery

Just as studies examining the association between ethnicity and cesarean section are inconclusive, so are the results from studies examining ethnicity's influence on operative vaginal deliveries. The present study found that a slightly higher percentage of Whites had an operative vaginal delivery compared to Hispanics (8.5% vs 5.4%, P=0.24), controlling for insurance status. These differences, however, were not statistically significant. These findings compare with the 1996 Report of Final Natality Statistics which similarly reported that Whites had slightly higher unadjusted rates of operative vaginal deliveries than non-Whites, although exact figures and significance levels were not included (Ventura, et al., 1998).

Socioeconomic Status.

Zahniser's study (1992) of obstetrical operative procedures from 1980-1987 initially found that Whites were significantly more likely to have a forceps-assisted delivery than non-Whites, but after stratification by insurance status, this racial difference was not seen. In Scotland, a more racially homogenous country where all women are covered by a national health system, Leyland found that women of "lower social class," measured by profession type, were less likely to have operative vaginal deliveries than women of "higher social class." Though the current study demonstrated a small White-Hispanic disparity for forceps/vacuum delivery while controlling for insurance status, there was also a small increased proportion of women having an operative vaginal delivery with increasing years of maternal education, another marker for socioeconomic status. Though not strictly comparable, these studies suggest women of higher socioeconomic status, whether measured by markers of insurance status, professional

type, or educational level, may receive higher levels of intervention regardless of their race or ethnicity.

Parity.

Nulliparous Whites were three times more likely than nulliparous Hispanics to have a forceps/vacuum delivery (18.0% vs 6.3%, P=0.02). Given the importance of parity in predicting operative vaginal delivery (Gould, 1989), it might be expected that these groups would have similar forceps/vacuum rates. A potential explanation for this difference between ethnic groups may be the higher use of epidural analgesia among Whites in general (Heuston, et al., 1994) and in this study.

Episiotomy

Although race does not appear to influence delivery method, it may contribute to the use of episiotomy and epidural during obstetrical management. Extending beyond the clinically indicated parameters of a large infant and operative vaginal delivery, episiotomy has been found to be associated with parity, epidural use, insurance status, provider specialty, and race (Hueston, 1996). Heuston (1996) and Shiono (Shiono, Klebanoff, and Carey, 1990) both found that White women were more likely than non-White women to have an episiotomy, though a direct White-Hispanic comparison was not made in either study. The current study supports past associations between ethnicity and episiotomy as, overall, a higher proportion of Whites had an episiotomy than Hispanics (14.3% vs 8.2%, P=0.06). Furthermore, for all subgroup analyses, including clinically related variables such as gestational age and maternal height, there was a trend toward the more frequent use of episiotomy among Whites, although not to a level of statistical significance.

Parity.

Because of the strong association between episiotomy and parity, it was expected that the White-Hispanic disparity in the use of episiotomy would not be seen upon analysis stratified by this variable. However, among nulliparous women, a small, non-significant White/Hispanic difference in the use of episiotomy was demonstrated (26.7% versus 16.1%, P=0.11). This trend may be related to the higher use of epidural among White women in general.

Epidural.

In the present study, a significantly greater proportion of Whites received epidural analgesia than Hispanics. This association likely contributes to the higher percentage of Whites having an episiotomy. However, even among women having no epidural analgesia, more Whites tended to receive an episiotomy (10.7% vs 4.3%, P=0.09). This disparity between groups is potentially due to parity, however, ability to test this hypothesis among those having both an episiotomy and epidural is not feasible given the small sample size within that subgroup.

In summary, the greater use of episiotomy among Whites may be explained, in part, by parity. But, even when controlling for parity, a higher proportion of Whites received an episiotomy when compared to Hispanics. An alternative hypothesis for this discrepancy is higher epidural use among Whites.

Epidural Analgesia

Although the primary focus of the study was cesarean, forceps/vacuum, and episiotomy interventions, this study noted an interesting disparity between the rates of epidural use among the two ethnic groups. Whites were significantly more likely to use

epidural analgesia during vaginal delivery than Hispanics. This pattern persisted when epidural use was stratified by age, education, parity, maternal height, gestational age, and provider specialty, though each of these findings, individually, was not statistically significant. These findings support previously published research examining the association between ethnicity and pain management. Heuston (1994) found that Whites were more likely than non-Whites to receive epidural anesthesia during labor. Similarly, Todd and colleagues (Todd, Samaroo, and Hoffman, 1993) found that in the emergency department, Whites were twice as likely as Hispanics to receive analgesia, after controlling for potential confounders related to patient, injury or provider.

Various hypotheses can be posed for the differing use of epidural analgesia for Whites and Hispanics during labor. First, Hispanics may express pain differently than Whites and providers may not identify the presence of pain in women who are culturally different than themselves (Todd, et al., 1993). Second, Hispanics may have different cultural expectations regarding pain relief during labor. Third, providers may not routinely offer an epidural to Hispanic women because of cultural or language barriers, and, therefore, potentially under-medicate a large population of childbearing women. Interestingly, the current study found that a higher percentage of White women managed by either an obstetrician or a certified nurse midwife were more likely than Hispanics in these groups to receive an epidural (63.2% vs 51.1%, P=0.06; and 46.2% vs 27.7%, P=0.09).

Summary

This study sought to compare the use of intrapartum interventions among uninsured White and Hispanic women at a university medical center. No statistical

differences were found between Whites and Hispanics in the likelihood of overall cesarean delivery, primary cesarean delivery, secondary cesarean delivery, operative vaginal delivery, and episiotomy. However, a greater proportion of Whites than Hispanics did receive episiotomy and epidural, and upon stratified analysis, the disparity between groups for these two interventions persisted, though not typically to a level of significance. Taken together, these findings suggest that intrapartum management, in general, is not influenced by patient ethnicity.

Where racial disparities do exist, several possible explanations have been put forth in effort to understand their etiologies. These explanations include cultural differences in reproductive patterns (including age and parity), epidural use, educational level, expectations of medical management, social and language barriers between the Hispanic patient and her provider, and provider fear of litigation. Whites and Hispanics in this study did differ on several important sociodemographic and clinical factors including maternal age, maternal education, maternal height, gestational age, use of epidural anesthesia, and provider. The impact of these factors on the association between race/ethnicity and intrapartum intervention is unknown but must be considered to interpret appropriately the results of this study. Because the current study did not use advanced statistical tests concurrently controlling for multiple covariates, the association between patient ethnicity and the studied interventions cannot be definitively characterized.

Limitations

As with all previous studies addressing the issue of ethnicity and medical intervention, this analysis was weakened by both biases and errors frequently associated

with cross-sectional studies and secondary data analyses. Because of the referral bias of high-risk White women being preferentially sent to this tertiary care center for management, White women as a group may have been at somewhat increased risk for specific interventions (cesarean section) upon study entry when compared to Hispanics. In spite of this potential inherent bias, Whites did not demonstrate a higher risk for cesarean delivery or operative vaginal delivery. Though this study did not compare Whites and Hispanics for pregnancy comorbidities, which would increase rates of operative delivery, groups were stratified by gestational age, another important marker for pregnancy risk. Among deliveries at term gestational age, Whites and Hispanics did not differ in rates of overall cesarean, primary and secondary cesarean, and operative vaginal delivery.

Additional limitations to this study are the potential reporting and recording errors that commonly occur during cross sectional data collection. Recall bias may have occurred with the interview portion of the data collection, but this is unlikely to have influenced the results of this analysis as all of the included primary outcome variables and majority of covariates were extracted directly from the medical chart. Because of the heavy reliance on the medical record, any recording errors would have been incorporated into the results of this study. Furthermore, several data collectors were used, thus adding possible interviewer bias to the study. Because data collection occurred within 24 hours of delivery, women having poor pregnancy outcomes may have been more likely to refuse participation in the study, thus artificially lowering the absolute number of recorded intrapartum interventions. Finally, cross-cultural studies may suffer from data collection errors due to language and cultural barriers. Although the interviewers in this

study were experienced translators, much information came from the medical record, thereby incorporating other providers' errors due to language deficiency into the study's database.

This study was a secondary analysis of data originally collected as part of a larger project. Consequently, this study could not examine the full spectrum of variables potentially influencing the relationship between race/ethnicity and intrapartum intervention. For example, this study was not able to examine the association between epidural placement and cesarean section outcome, as the database only contained this information for women having a vaginal delivery. Additionally, secondary analysis of previously collected data provides less evidence towards a causal link; such analyses are simply used by researchers to search for potential associations.

In undertaking a secondary analysis, the researcher is at risk of violating the law of multiple comparisons. This study calculated more than one-hundred separate chi-square values. By chance alone, five percent of these tests are expected to have a significant result using a p-value of 0.05. Such analyses are important, however, as trends in patient management can be identified and subsequently confirmed with results from primary studies having larger sample sizes. For example, in this study, the percentage of Whites having a vacuum/forceps assisted delivery differed from the percentage among Hispanics, but only 26 women were included in this analysis, making it difficult to reach statistical significance. A subsequent prospective study, with a larger sample size, having forceps/vacuum-assisted delivery as the primary outcome variable could provide a more definitive answer to this question.

Conclusion

This study suggests that any explanation for race/ethnicity disparity in intrapartum interventions is multifactoral. This multifactoral explanation is certainly a sum of both clinical and sociocultural contributions. To delineate further and, eventually, to quantify the contribution of each factor, larger sample sizes and more advanced statistical analyses including multiple variable regression modeling are required. Further research in this area is warranted given the burgeoning Hispanic population in the U.S. and the need for standardized care. As social and clinical factors affecting care are identified, the approach to each patient can be individualized in order to assure equivalence of pregnancy, labor, and delivery management.

REFERENCES

Braveman, P., Egerter, S., Edmonston, F. & Verdon, M. (1995). Racial/ethnic differences in the likelihood of cesarean delivery, California. American Journal of Public Health, 85(5), 625-131.

Centers for Disease Control. (1993). Rates of cesarean delivery—United States, 1991. MMRW Morbidity and Mortality Weekly Report, 42, 285-289.

Cunningham, F.G., MacDonald, P.C., Gant, N.F., Levano, K.J., & Gilstrap, L.C.III. (Eds.). (1993). Williams Obstetrics (19th ed.). Norwalk, CT: Appleton & Lange.

Cunningham, F.G., MacDonald, P.C., Gant, N.F., Levano, K.J., & Gilstrap, L.C.III. (Eds.). (1997). Williams Obstetrics (20th ed.). Norwalk, CT: Appleton & Lange.

Curtin, S.C. (1997). Rates of cesarean birth and vaginal birth after previous cesarean, 1991-1995. Monthly Vital Statistics Report, 45(11), supp. 3. Hyattsville, Maryland: National Center for Health Statistics.

Dougherty, C.R.S. & Jones, A.D. (1988). Obstetric management and outcome related to maternal characteristics. American Journal of Obstetrics & Gynecology, 158, 470-474.

Ginsberg, E. (1991). Access to healthcare for Hispanics. JAMA,256, 238-41.

Green, D.C., Moore, J.M., Adams, M.M., Berg, C.J., Wilcox, L.S. & McCarthy, B.J. (1998). Are we underestimating rates of vaginal birth after previous cesarean birth? The validity of delivery methods from birth certificates. American Journal of Epidemiology,147, 581-6.

Gould, J.B. Davey, B., & Stafford, R.S. (1989). Socioeconomic differences in rates of cesarean section. New England Journal of Medicine, 321(4), 233-9.

Hueston, W.J. (1996). Factors associated with the use of episiotomy during vaginal delivery. Obstetrics & Gynecology, 87, 1001-1005.

Heuston, W.J., McClaflin, R.R., Mansfield, C.J., & Rudy, M. (1994). Factors associated with the use of intrapartum epidural analgesia. Obstetrics and Gynecology,84, 579-582.

Irwin, D.E., Savitz, D.A. Watson, A.B, & St. Andre, K.A. (1996). Race, age, and cesarean delivery in a military population. Obstetrics & Gynecology, 88(4), 530-533.

Johnson, N.P., Lewis, J., & Ansell, D.A. (1995). Does ethnicity influence obstetric intervention? New Zealand Medical Journal,108, 511-512.

King, D.E. & Lahiri, K. (1994). Socioeconomic factors and the odds of vaginal birth after cesarean delivery. JAMA,272(7), 524-529.

Lede, R.L., Belizan, J.M., & Carroli, G. (1996). Is routine use of episiotomy justified? American Journal of Obstetrics and Gynecology, 174(5), 1399-1402.

Leyland, A. (1993). Socioeconomic and racial differences in obstetric procedures [Letter to the editor]. American Journal of Public Health, 83(8), 1178-1179.

Lucus, M.J. (1994). The role of vacuum extraction in modern obstetrics. Clinical Obstetrics & Gynecology, 37(4), 794-805.

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

Mathews, T.J., Ventura, S.J., Curtin, S.C., & Martin, J.A. (1998). Births of Hispanic origin, 1989-95. Monthly Vital Statistics Report, 46(6), supp. Hyattsville, Maryland: National Center for Health Statistics.

McClain, S.C. (1990). The making of a medical tradition: Vaginal birth after cesarean. Social Science and Medicine,31, 203-210.

Notzon, F.C., Cnattingius, S., Bergsjo, P., Cole, S., Taffel, S., Irgens, L., & Daltveit, A.K. (1994). Cesarean section delivery in the 1980s: International comparison by indication. American Journal of Obstetrics and Gynecology, 170, 495.

Placek P.J. & Taffel, S.M. (1988). Recent patterns in cesarean delivery in the United States. Obstetrics and Gynecology Clinics of North America, 15, 607-627.

Placek, P.J., Taffel, S., Moien, M. (1983). Cesarean section delivery rate: United States, 1981. American Journal of Public Health, 73, 861-862.

Price, M.R. & Broomberg, J. (1990). The impact of the fee-for-service reimbursement system on the utilization of health services, part III. A comparison of cesarean section rates in White nulliparous women in the private and public sectors. South African Medical Journal,78(3), 136-8.

Read, A.W., Prendiville, W.J., Dawes, V.P. & Stanley, F.J. (1994). Cesarean section and operative vaginal delivery in low-risk primiparous women, Western Australia. American Journal of Public Health, 84(1) 37-42.

Ruderman, J., Carroll, J.C., Reid, A.J.& Murray, M.A. (1993). Are physicians changing the way the practice obstetrics? Canadian Medial Association Journal, 248, 409-415.

Scupholme, A., DeJoseph, J., Strobino, D.M., & Paine, L.L. (1992). Nurse-midwifery care to vulnerable populations: Phase I: Demographic characteristics of the national CNM sample. Journal of Nurse-Midwifery, 37(5), 341-347.

Shiono, P., Klebanoff, M.A., & Carey, C. (1990). Midline episiotomies: More harm than Good? Obstetrics and Gynecology, 75(5), 765-770.

Stafford, R.S., Sullivan, S.D. & Gardner, L.B. (1993). Trends in cesarean section use in California, 1983-1990. American Journal of Obstetrics and Gynecology, 168(4), 1297-1302.

Stafford, R.S. (1991). The impact of non-clinical factors on repeat cesarean section. JAMA, 265, 59-63.

Taffel, S.M. (1994). Cesarean delivery in the United States, 1990. Vital & Health Statistics. Series 21, Data on Natality, Marriage, & Divorce,51,1-24.

Thacker, S.B. & Banta, H.D. (1983). Benefits and risks of episiotomy: An interpretative review of the English language literature, 1860-1980. Obstetrical and Gynecological Survey, 38(6), 322-334.

Thompson, J.P. (1995). Forcep deliveries. Clinics in Perinatology, 22(4), 953-972.

Todd, K.H., Samaroo, N. & Hoffman, J.R. (1993). Ethnicity as a risk factor for inadequate emergency department analgesia. JAMA, 269, 1537-1539.

U.S. Bureau of the Census. (1996). Population projection of the United States by age, sex, race & Hispanic origin: 1995-2050. Current Population Report, 20-21.

Vacca. A . Gramt. A. & Wyaatt, G. (1983). Portsmith operative delivery trial: A comparison of vacuum extraction and forceps delivery. British Journal of Obstetrics and Gynaecology, 90, 1107-1112.

Ventura, S.J., Martin, J.A., Curtin, S.C., Mathews, T.J. (1998). Report of Final Natality Statistics, 1996. Monthly Vital Statistics Report, 46(11), supp. Hyattsville, Maryland: National Center for Health Statistics.

Williams, M.C. (1995). Vacuum-assisted delivery. Clinics in Perinatology, 22(4), 933-951.

Williams, R.L. & Hawes, W.E. (1979). Cesarean section, fetal monitoring, and perinatal mortality. American Journal of Public Health, 69(9), 864-870.

Yeomans, E. & Gilstrap, L. (1994). The role of forceps in modern obstetrics. Clinical Obstetrics and Gynecology, 37(4), 785-793.

Zahniser, S.C., Kendrick, J.S., Franks, A.L. & Saftlas, A.F. (1992). Trends in obstetric operative procedures, 1980 to 1987. American Journal of Public Health, 82(10), 1340-1344.

Zahniser S.C. & Kendrick, J.S. (1993). Zahniser and Kendrick respond [Letter to the editor]. American Journal of Public Health, 83(8), 1179.

Appendix A

INTERVIEW Interviewer name _____ Date: _____

1. What is your age? _____ 2. What is the FOB's age? _____
3. What is your race/ ethnicity? Wht Blk Hsp Asian Other_____
4. What is the FOB's race/ ethnicity? Wht Blk Hsp Asian Other_____
5. In which country were you born? USA Mexico Other_____
   A. How many years have you lived in the US? _____
6. In which country was the FOB born? USA Mexico Other_____
   A. How many years has the FOB lived in the US? _____
7. What is your primary language at home? Spanish English Other: _____
8. What is the FOB's primary language? Spanish English Other: _____
9. What is your height? _____ 10. FOB's height? _____
11. What was your weight before the pregnancy? _____ 12. At delivery? _____
    ALTERNATIVE: How much weight did you gain during your pregnancy:? _____
13. How many years of schooling have you completed? _____
14. How many years of schooling has the FOB completed? _____
15. What is your primary occupation? _____
16. What is the FOB's primary occupation? _____
17. How many people do you live with (including the new baby) ? _____
18. Do you live with the FOB? Yes No
19. What is your marital status? Sgle Mar Div Wid Sep
20. Were you using a birth control method at the time of conception? Yes No
    A. Which birth control method? Pill Condoms Depo Other: _____
21. Was this a planned pregnancy? Yes No
22. Are you planning on breastfeeding? Yes No Undecided
23. Are you planning to use a birth control method? Yes No Undecided
    A. Which birth control method: Pill Condom Depo Other: _____
24. Have you ever had a sexually transmitted disease? Yes No
26. Do you smoke cigarettes? Y N 26. Have you ever smoked? Y N
    A. Why did you quit smoking? Baby Other: _____
27. Did you drink alcohol at any time during the pregnancy? Yes No Quit for baby
28. Do you use any drugs? Y N 29. Have you ever used any drugs? Y N

Appendix B

Interviewer Date

Pay code Parity Gravida Term Preterm Abortions Living

Mo/yr prev delivery, Estimated gestational age, Delivery type, Birth weight, Gender, Complications, Lac (degree), Apgars

1

2

3

4

5

6

Antepartum data - *1st trimester=0-12 wks* *2nd trimester=13-28 wks* *3rd trimester=29-40wks*

EGA at 1st PNC visit:_____ Total 1st trimester PNC visits:_____

Total PNC visits:_____

Max BP in 1st trimester: Syst- Diast-

Medications during pregnancy: PMH: PSH: FamHx (interview PRN)

HTN? Y N

DM? Y N

PET? Y N

PNL -

1 hr GTT: Blood type: GC: + - 0 CT: + - 0

3 hr GTT: Rubella: Imm NI 0 VRDL (RPR): R NR 0 HIV: + - 0

HCT: MSAFP: WNL Ab 0 HbsAg: + - 0 PPD: + - 0

Intrapartum data -

Operative interventions?: None C/S - 1° or 2° Vacuum Forceps Episiotomy

Admit BP: Syst - Diast - Proteinuria + - 0 Edema + - 0

MgSO4? (Order #13): Y N

Ante/intrapartum augmentation: Pitocin Misoprostol None

Analgesia Epidural Spinal Pudendal None Other_____

Name: _____ Medical record number _____

Table I. Description of Sample: Frequency of Intrapartum Interventions

Delivery Type (missing=0)	N	%
Vaginal Delivery*	371	78.9%
Primary Cesarean Delivery	45	9.6%
Secondary Cesarean Delivery	29	6.2%
Vaginal Birth After Cesarean Delivery (VBAC)	25	5.3%
Operative Interventions among All Vaginal Deliveries		
Forceps/Vacuum**	26	6.5%
Episiotomy	41	10.4%

*VBAC numbers not included in vaginal delivery total in this table.
** Three Forceps/vacuum procedures were conducted during hysterotomy. These procedures are not included in forceps/vacuum total.

Table II. Description of Sample: Sociodemographic Characteristics

	N	%
OVERALL	470	100%
Race/Ethnicity (missing=0)		
White Non-Hispanic	168	35.7%
Hispanic	302	64.3%
Age (years) (missing=1)		
14 to 19	89	19.0%
20 to 24	151	32.2%
25 to 34	196	41.8%
35 and older	33	7.0%
Maternal Education (missing=35)		
Grade 0 to 6	121	27.8%
Grade 7 to 11	158	36.3%
Grade 12	90	20.7%
Grade 13 and Greater	66	15.2%
Marital Status (missing=34)		
Single	226	51.8%
Married	210	48.2%

Table III. Description of Sample: Maternal and Neonatal Characteristics

Parity (missing=9)	N	%
Nulliparous	187	40.6%
Multiparous	274	59.4%
Maternal Height (missing=50)		
Less than 62 inches (< 158 cm)	129	30.7%
62 to 66 inches (158 to 168 cm)	236	56.2%
Greater than 66 inches (>168 cm)	55	13.1%
Birth Weight (missing=17)		
Less than 2500g	36	7.9%
2500g to 4000g	381	84.1%
Greater than 4000g	36	7.9%
Gestational Age (weeks) (missing=12)		
20 to 36	49	10.7%
37 to 40	328	71.6%
41 to 42	81	17.7%
Infant Gender (missing=14)		
Male	237	52.0%
Female	219	48.0%
Epidural for VD (missing=0)		
No Epidural/Spinal	195	49.2%
Epidural/Spinal	201	50.8%
Provider (missing=6)		
Obstetrician	331	71.3%
CNM	97	20.9%
Family Practice	36	7.8%

Table IV. Bivariate Analysis: Ethnicity by Sociodemographic Characteristics

	White Non-Hispanic	Hispanic	P-Value*
Age (years) (missing=1)			
14-19	34 (20.4%)	55 (18.2%)	P<0.01
20-24	45 (26.9%)	106 (35.1%)	
25-34	68 (40.7%)	128 (42.4%)	
35 +	20 (12.0%)	13 (04.3%)	
Education (missing=35)			
Grade 0 to 6	2 (01.3%)	119 (42.2%)	P<0.001
Grade 7 to 11	50 (32.7%)	108 (38.3%)	
Grade 12	51 (33.3%)	39 (13.8%)	
Grade 13 and Greater	50 (32.7%)	16 (05.7%)	
Marital Status (missing=34)			
Not Married	85 (55.6%)	141 (49.8%)	P=0.25
Married	68 (44.4%)	142 (50.2%)	

* As calculated using Chi-Square or Fisher's Exact Test (when approriate).

Table V. Bivariate Analysis: Ethnicity by Maternal and Neonatal Characteristics

	White Non-Hispanic	Hispanic	P-Value*
Parity (missing=9)			
Nulliparous	73 (44.0%)	114 (38.6%)	P=0.26
Multiparous	93 (56.0%)	181 (61.4%)	
Maternal Height (missing=50)			
Less than 62 inches (< 158 cm)	14 (09.2%)	115 (43.1%)	P<0.001
62 to 66 inches (158 to 168 cm)	97 (63.4%)	139 (52.1%)	
Greater than 66 inches (>168 cm)	42 (27.5%)	13 (04.9%)	
Birth Weight (missing=17)			
Less than 2500 g	14 (08.5%)	22 (07.6%)	P=0.71
2500 tp 4000 g	135 (82.3%)	246 (85.1%)	
Greater than 4000 g	15 (09.1%)	21 (07.3%)	
Gestational Age (missing=12)			
20 to 36 weeks	25 (15.1%)	24 (08.2%)	P=0.05
37 to 40 weeks	117 (70.5%)	211 (72.3%)	
41 to 42 weeks	24 (14.5%)	57 (19.5%)	
Infant Gender (missing=14)			
Male	82 (50.6%)	155 (52.7%)	P=0.67
Female	80 (49.4%)	139 (47.3%)	
Epidural for VD (missing=0)			
No Epidural/Spinal	56 (40.0%)	139 (54.3%)	P<0.01
Epidural/Spinal	84 (60.0%)	117 (45.7%)	
Provider (missing= 6)			
Obstetrician	112 (66.7%)	219 (74.0%)	P<0.001
CNM	27 (16.1%)	70 (23.6%)	
Family Practice	29 (17.3%)	7 (02.4%)	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table VI. Bivariate Analysis (Study Question): Ethnicity by Intrapartum Intervention

	White Non-Hispanic	Hispanic	P-Value*
Delivery Type (missing=0)			
Vaginal Delivery (Including VBACs)	140 (83.3%)	256 (84.8%)	P=0.68
Cesarean Delivery	28 (16.7%)	46 (15.2%)	
Operative Interventions among Vaginal Deliveries (VD)			
No Forceps/Vacuum	129 (91.5%)	243 (94.6%)	P=0.24
Forceps/Vacuum	12 (08.5%)	14 (05.4%)	
No Episiotomy	120 (85.7%)	235 (91.8%)	P=0.06
Episiotomy	20 (14.3%)	21 (08.2%)	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table VII. **Stratified Analysis: Cesarean Delivery by Maternal and Neonatal Characteristics**

	No Cesarean Section	Cesarean Section	P-Value*
All Women			
White Non-Hispanic	140 (83.3%)	28 (16.7%)	P=0.68
Hispanic	256 (84.8%)	46 (15.2%)	
Age			
14 to 19 years			
White Non-Hispanic	29 (85.3%)	5 (14.7%)	P=1.00
Hispanic	48 (87.3%)	7 (12.7%)	
20 to 24 years			
White Non-Hispanic	39 (86.7%)	6 (13.3%)	P=0.58
Hispanic	88 (83.0%)	18 (17.0%)	
25 to 34 years			
White Non-Hispanic	55 (80.9%)	13 (19.1%)	P=0.44
Hispanic	109 (85.2%)	19 (14.8%)	
35 years or greater			
White Non-Hispanic	16 (80.0%)	4 (20.0%)	P=1.00
Hispanic	11 (84.6%)	2 (15.4%)	
Education			
Grade 0 to 6			
White Non-Hispanic	2 (100%)	0	P=1.00
Hispanic	101 (84.9%)	18 (15.1)%	
Grade 7 to 11			
White Non-Hispanic	43 (86.0%)	7 (14.0%)	P=0.99
Hispanic	93 (86.1%)	15 (13.9%)	
Grade 12			
White Non-Hispanic	43 (84.3%)	8 (15.7%)	P=0.55
Hispanic	31 (79.5%)	8 (20.5%)	
Grade 13 and Greater			
White Non-Hispanic	37 (74.0%)	13 (26.0%)	P=1.00
Hispanic	12 (75.0%)	4 (25.0 %)	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table VIII. Stratified Analysis: Cesarean Delivery by Maternal and Neonatal Characteristics (continued)

	No Cesarean Section	Cesarean Section	P-Value*
Parity			
Nulliparous			
White Non-Hispanic	60 (82.2%)	13 (17.8%)	P=0.96
Hispanic	94 (82.5%)	20 (17.5%)	
Multiparous			
White Non-Hispanic	78 (83.9%)	15 (16.1%)	P=0.70
Hispanic	155 (85.6%)	26 (14.4%)	
Maternal Height			
Less than 62 inches			
White Non-Hispanic	10 (71.4%)	4 (28.6%)	P=0.23
Hispanic	99 (86.1%)	16 (13.9%)	
62 to 66 inches			
White Non-Hispanic	81 (83.5%)	16 (16.5%)	P=0.88
Hispanic	115 (82.7%)	24 (17.3%)	
Greater than 66 inches			
White Non-Hispanic	34 (81.0%)	8 (19.0%)	P=0.71
Hispanic	10 (76.9%)	3 (23.1%)	
Gestational Age			
20 to 36 weeks			
White Non-Hispanic	17 (68.0%)	8 (32.0%)	P=0.92
Hispanic	16 (66.7%)	8 (33.3%)	
37 to 40 weeks			
White Non-Hispanic	100 (85.5%)	17 (14.5%)	P=0.49
Hispanic	186 (88.2%)	25 (11.8%)	
41 to 42 weeks			
White Non-Hispanic	21 (87.5%)	3 (12.5%)	P=0.53
Hispanic	45 (78.9%)	12 (21.1%)	
Provider			
Obstetrician			
White Non-Hispanic	87 (77.7%)	25 (22.3%)	P=0.44
Hispanic	178 (81.3%)	41 (18.7%)	
CNM			
White Non-Hispanic	26 (96.3%)	1 (03.7%)	P=1.00
Hispanic	65 (92.9%)	5 (07.1%)	
Family Practice			
White Non-Hispanic	27 (93.1%)	2 (06.9%)	P=1.00
Hispanic	7 (100%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table IX. Stratified Analysis: Primary Cesarean Delivery by Maternal and Neonatal Characteristics

	No Cesarean Section	Cesarean Section	P-Value*
All at risk women			
White Non-Hispanic	135 (87.1%)	20 (12.9%)	P=0.29
Hispanic	236 (90.4%)	25 (09.6%)	
Age			
14 to 19 years			
White Non-Hispanic	29 (87.9%)	4 (12.1%)	P=1.00
Hispanic	47 (87.0%)	7 (13.0%)	
20 to 24 years			
White Non-Hispanic	38 (90.5%)	4 (09.5%)	P=0.78
Hispanic	82 (87.2%)	12 (12.8%)	
25 to 34 years			
White Non-Hispanic	52 (81.3%)	12 (18.8%)	P<0.01
Hispanic	98 (94.2%)	6 (05.8%)	
35 years or greater			
White Non-Hispanic	15 (100%)	0	
Hispanic	9 (100%)	0	
Education			
Grade 0 to 6			
White Non-Hispanic	2 (100.0%)	0	P=1.00
Hispanic	91 (89.2%)	11 (10.8%)	
Grade 7 to 11			
White Non-Hispanic	42 (89.4%)	5 (10.6%)	P=0.55
Hispanic	85 (92.4%)	7 (07.6%)	
Grade 12			
White Non-Hispanic	42 (89.4%)	5 (10.6%)	P=0.42
Hispanic	30 (83.3%)	6 (16.7%)	
Grade 13 and Greater			
White Non-Hispanic	34 (77.3%)	10 (22.7%)	P=0.18
Hispanic	11 (100%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table X. Stratified Analysis: Primary Cesarean Delivery by Maternal and Neonatal Characteristics (continued)

	No Cesarean Section	Cesarean Section	P-Value*
Parity			
Nulliparous			
White Non-Hispanic	60 (82.2%)	13 (17.8%)	P=0.98
Hispanic	93 (82.3%)	20 (17.7%)	
Multiparous			
White Non-Hispanic	73 (91.3%)	7 (08.8%)	P=0.10
Hispanic	136 (96.5%)	5 (03.5%)	
Maternal Height			
Less than 62 inches			
White Non-Hispanic	10 (76.9%)	3 (23.1%)	P=0.09
Hispanic	91 (92.9%)	7 (07.1%)	
62 to 66 inches			
White Non-Hispanic	79 (87.8%)	11 (12.2%)	P=0.93
Hispanic	104 (88.1%)	14 (11.9%)	
Greater than 66 inches			
White Non-Hispanic	31 (83.8%)	6 (16.2%)	P=1.00
Hispanic	10 (90.9%)	1 (09.1%)	
Gestational Age			
20 to 36 weeks			
White Non-Hispanic	17 (73.9%)	6 (26.1%)	P=0.53
Hispanic	13 (65.0%)	7 (35.0%)	
37 to 40 weeks			
White Non-Hispanic	96 (88.9%)	12 (11.1%)	P=0.12
Hispanic	172 (94.0%)	11 (06.0%)	
41 to 42 weeks			
White Non-Hispanic	20 (90.9%)	2 (09.1%)	P=1.00
Hispanic	42 (87.5%)	6 (12.5%)	
Provider			
Obstetrician			
White Non-Hispanic	85 (83.3%)	17 (16.7%)	P=0.24
Hispanic	159 (88.3%)	21 (11.7%)	
CNM			
White Non-Hispanic	24 (96.0%)	1 (04.0%)	P=1.00
Hispanic	64 (94.1%)	4 (05.9%)	
Family Practice			
White Non-Hispanic	26 (92.9%)	2 (07.1%)	P=1.00
Hispanic	7 (100%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XI. Stratified Analysis: Secondary Cesarean Delivery by Maternal and Neonatal Characteristics

	No Cesarean Section (VBAC)	Cesarean Section	P-Value*
All Women			
White Non-Hispanic	5 (38.5%)	8 (61.5%)	P=0.52
Hispanic	20 (48.8%)	21 (51.2%)	
Age			
14 to 19 years			
White Non-Hispanic	0	1 (100%)	P=1.00
Hispanic	1 (100%)	0	
20 to 24 years			
White Non-Hispanic	1 (33.3%)	2 (66.6%)	P=1.00
Hispanic	6 (50%)	6 (50.0%)	
25 to 34 years			
White Non-Hispanic	3 (75.0%)	1 (25.0%)	P=0.60
Hispanic	11 (45.8%)	13 (54.2%)	
35 years or greater			
White Non-Hispanic	1 (20.0%)	4 (80.0%)	P=0.52
Hispanic	2 (50.0%)	2 (50.0%)	
Education			
Grade 0 to 6			
White Non-Hispanic	0	0	P=1.00
Hispanic	10 (58.8%)	7 (41.2%)	
Grade 7 to 11			
White Non-Hispanic	1 (33.3%)	2 (66.7%)	P=1.00
Hispanic	8 (50.0%)	8 (50.0%)	
Grade 12			
White Non-Hispanic	1 (25.0%)	3 (75.0%)	P=1.00
Hispanic	1 (33.3%)	2 (66.7%)	
Grade 13 and Greater			
White Non-Hispanic	3 (50.0%)	3 (50.0%)	P=0.55
Hispanic	1 (20.0%)	4 (80.0%)	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XII. Stratified Analysis: Secondary Cesarean Delivery by Maternal and Neonatal Characteristics (continued)

	No Cesarean Section (VBAC)	Cesarean Section	P-Value*
Parity			
Nulliparous			
White Non-Hispanic	5 (38.5%)	8 (61.5%)	P=0.52
Hispanic	20 (48.8%)	21 (51.2%)	
Maternal Height			
Less than 62 inches			
White Non-Hispanic	0	1 (100%)	P=1.0
Hispanic	8 (47.1%)	9 (52.9%)	
62 to 66 inches			
White Non-Hispanic	2 (28.6%)	5 (71.4%)	P=0.40
Hispanic	11 (52.4%)	10 (47.6%)	
Greater than 66 inches			
White Non-Hispanic	3 (60.0%)	2 (40.0%)	P=0.43
Hispanic	0	2 (100%)	
Gestational Age			
20 to 36 weeks			
White Non-Hispanic	0	2 (100%)	P=0.40
Hispanic	3 (75.0%)	1 (25.0%)	
37 to 40 weeks			
White Non-Hispanic	4 (44.4%)	5 (55.6%)	P=1.00
Hispanic	14 (50.0%)	14 (50.0%)	
41 to 42 weeks			
White Non-Hispanic	1 (50.0%)	1 (50.0%)	P=1.00
Hispanic	3 (33.3%)	6 (66.7%)	
Provider			
Obstetrician			
White Non-Hispanic	2 (20.0%)	8 (80.0%)	P=0.16
Hispanic	19 (48.7%)	20 (51.3%)	
CNM			
White Non-Hispanic	2 (100%)	0	P=1.00
Hispanic	1 (50.0%)	1 (50.0%)	
Family Practice			
White Non-Hispanic	1 (100%)	0	
Hispanic	0	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XIII. Stratified Analysis: Forceps-Vacuum Operative Vaginal Delivery by Maternal and Neonatal Characteristics

	No Forceps/Vacuum	Forceps/Vacuum	P-Value*
All Women			
White Non-Hispanic	129 (91.5%)	12 (08.5%)	P=0.24
Hispanic	243 (94.6%)	14 (05.4%)	
Age			
14 to 19 years			
White Non-Hispanic	26 (89.7%)	3 (10.3%)	P=1.00
Hispanic	44 (89.8%)	5 (10.2%)	
20 to 24 years			
White Non-Hispanic	36 (92.3%)	3 (07.7%)	P=0.70
Hispanic	83 (94.3%)	5 (05.7%)	
25 to 34 years			
White Non-Hispanic	51 (91.1%)	5 (8.9%)	P=0.12
Hispanic	106 (97.2%)	3 (02.8%)	
35 years or greater			
White Non-Hispanic	15 (93.8%)	1 (06.3%)	P=1.00
Hispanic	10 (90.9%)	1 (09.1%)	
Education			
Grade 0 to 6			
White Non-Hispanic	2 (100%)	0	P=1.00
Hispanic	100 (98.0%)	2 (02.0%)	
Grade 7 to 11			
White Non-Hispanic	42 (97.7%)	1 (02.3%)	P=0.43
Hispanic	87 (93.5%)	6 (06.5%)	
Grade 12			
White Non-Hispanic	38 (88.4%)	5 (11.6%)	P=1.00
Hispanic	27 (87.1%)	4 (12.9%)	
Grade 13 and Greater			
White Non-Hispanic	32 (84.2%)	6 (15.8%)	P=0.31
Hispanic	12 (100%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XIV. Stratified Analysis: Forceps-Vacuum Operative Vaginal Delivery by Maternal and Neonatal Characteristics (continued)

	No Forceps/Vacuum	Forceps/Vacuum	P-Value*
Parity			
Nulliparous			
White Non-Hispanic	50 (82.0%)	11 (18.0%)	P=0.02
Hispanic	89 (93.7%)	6 (06.3%)	
Multiparous			
White Non-Hispanic	77 (98.7%)	1 (01.3%)	P=0.27
Hispanic	148 (95.5%)	7 (04.5%)	
Maternal Height			
Less than 62 inches			
White Non-Hispanic	9 (90.0%)	1 (10.0%)	P=0.26
Hispanic	96 (97.0%)	3 (03.0%)	
62 to 66 inches			
White Non-Hispanic	74 (90.2%)	8 (09.8%)	P=0.47
Hispanic	108 (93.1%)	8 (06.9%)	
Greater than 66 inches			
White Non-Hispanic	31 (91.2%)	3 (08.8%)	P=1.00
Hispanic	10 (100%)	0	
Gestational Age			
20 to 36 weeks			
White Non-Hispanic	16 (94.1%)	1 (05.9%)	P=1.00
Hispanic	16 (100%)	0	
37 to 40 weeks			
White Non-Hispanic	92 (91.1%)	9 (08.9%)	P=0.11
Hispanic	178 (95.7%)	8 (04.3%)	
41 to 42 weeks			
White Non-Hispanic	19 (90.5%)	2 (09.5%)	P=1.00
Hispanic	41 (89.1%)	5 (10.9%)	
Epidural for VD			
No Epidural			
White Non-Hispanic	54 (96.4%)	2 (03.6%)	P=1.00
Hispanic	134 (96.4%)	5 (03.6%)	
Epidural			
White Non-Hispanic	75 (89.3%)	9 (10.7%)	P=0.33
Hispanic	109 (93.2%)	8 (06.8%)	
Provider			
Obstetrician			
White Non-Hispanic	79 (90.8%)	8 (09.2%)	P=0.08
Hispanic	172 (96.1%)	7 (03.9%)	
CNM			
White Non-Hispanic	25 (95.2%)	1 (03.8%)	P=0.43
Hispanic	58 (89.2%)	7 (10.8%)	
Family Practice			
White Non-Hispanic	25 (89.3%)	3 (10.7%)	P=1.00
Hispanic	7 (100.0%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XV. **Stratified Analysis: Episiotomy by Maternal and Neonatal Characteristics**

	No Episiotomy	Episiotomy	P-Value*
All Women			
White Non-Hispanic	120 (85.7%)	20 (14.3%)	P=0.06
Hispanic	235 (91.8%)	21 (08.2%)	
Age			
14 to 19 years			
White Non-Hispanic	25 (86.2%)	4 (13.8%)	P=1.00
Hispanic	40 (83.3%)	8 (16.7%)	
20 to 24 years			
White Non-Hispanic	35 (89.7%)	4(10.3%)	P=1.00
Hispanic	79 (89.8%)	9 (10.2%)	
25 to 34 years			
White Non-Hispanic	47 (85.5%)	8 (14.5%)	P=0.02
Hispanic	105 (96.3%)	4 (03.7%)	
35 years or greater			
White Non-Hispanic	12 (75.0%)	4 (25.0%)	P=0.12
Hispanic	11 (100.0%)	0	
Education			
Grade 0 to 6			
White Non-Hispanic	2 (100%)	0	P=1.00
Hispanic	92 (91.1%)	9 (08.9%)	
Grade 7 to 11			
White Non-Hispanic	41 (95.3%)	2 (04.7%)	P=0.50
Hispanic	85 (91.4%)	8 (08.6%)	
Grade 12			
White Non-Hispanic	35 (81.4%)	8 (18.6%)	P=0.34
Hispanic	28 (90.3%)	3 (09.7%)	
Grade 13 and Greater			
White Non-Hispanic	27 (73.0%)	10 (27.0%)	P=0.09
Hispanic	12 (100%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XVI. Stratified Analysis: Episiotomy by Maternal and Neonatal Characteristics (continued)_

	No episiotomy	Episiotomy	P-Value*
Parity			
Nulliparous			
White Non-Hispanic	44 (73.3%)	16 (26.7%)	P=0.11
Hispanic	78 (83.9%)	15 (16.1%)	
Multiparous			
White Non-Hispanic	74 (94.9%)	4 (5.1%)	P=0.74
Hispanic	150 (96.2%)	6(03.8%)	
Maternal Height			
Less than 62 inches			
White Non-Hispanic	8 (80.0%)	2 (20.0%)	P=0.23
Hispanic	91 (91.9%)	8 (08.1%)	
62 to 66 inches			
White Non-Hispanic	71 (87.7%)	10 (12.3%)	P=0.41
Hispanic	105 (91.3%)	10 (08.7%)	
Greater than 66 inches			
White Non-Hispanic	26 (76.5%)	8 (23.5%)	P=0.17
Hispanic	10 (100%)	0	
Gestational Age			
20 to 36 weeks			
White Non-Hispanic	16 (94.1%)	1 (05.9%)	P=1.00
Hispanic	16 (100%)		
37 to 40 weeks			
White Non-Hispanic	86 (86.0%	14 (14.0%)	P=0.05
Hispanic	173 (93.0%)	13 (07.0%)	
41 to 42 weeks			
White Non-Hispanic	16 (76.2%)	5 (23.8%)	P=0.57
Hispanic	37 (82.2%)	8 (17.8%)	
Epidural for VD			
No Epidural			
White Non-Hispanic	50 (89.3%)	6 (10.7%)	P=0.09
Hispanic	133 (95.7%)	6 (04.3%)	
Epidural			
White Non-Hispanic	70 (83.3%)	14 (16.7%)	P=0.44
Hispanic	102 (87.2%)	15 (12.8%)	
Provider			
Obstetrician			
White Non-Hispanic	77 (88.5%)	10 (11.5%)	P=0.26
Hispanic	165 (92.7%)	13 (07.3%)	
CNM			
White Non-Hispanic	21 (80.8%)	5 (19.2%)	P=0.39
Hispanic	57 (87.7%)	8 (12.3%)	
Family Practice			
White Non-Hispanic	22 (81.5%)	5 (18.5%)	P=0.56
Hispanic	7 (100%)	0	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XVII. Stratified Analysis: Epidural by Maternal and Neonatal Characteristics

	No Epidural	Epidural	P-Value*
All Women			
White Non-Hispanic	56 (40.0%)	84 (60.0%)	P<0.01
Hispanic	139 (54.3%)	117 (45.7%)	
Age			
14 to 19 years			
White Non-Hispanic	12 (41.4%)	17 (58.6%)	P= 0.98
Hispanic	20 (41.7%)	28 (58.3%)	
20 to 24 years			
White Non-Hispanic	10 (25.6%)	29 (74.4%)	P<0.01
Hispanic	47 (53.4%)	41 (46.6%)	
25 to 34 years			
White Non-Hispanic	26 (47.3%)	29 (52.7%)	P=0.13
Hispanic	63 (57.8%)	46 (42.2%)	
35 years or greater			
White Non-Hispanic	8 (50.0%)	8 (50.0%)	P=0.12
Hispanic	9 (81.8%)	2 (18.2%)	
Education			
Grade 0 to 6			
White Non-Hispanic	1(50.0%)	1 (50.0%)	P=1.00
Hispanic	59 (58.4%)	42 (41.6%)	
Grade 7 to 11			
White Non-Hispanic	15 (34.9%)	28 (65.1%)	P=0.31
Hispanic	41 (44.1%)	52 (55.9%)	
Grade 12			
White Non-Hispanic	17 (39.5%)	26 (60.5%)	P=0.19
Hispanic	17 (54.8%)	14 (45.2%)	
Grade 13 and Greater			
White Non-Hispanic	18 (48.6%)	19 (51.4%)	P=0.56
Hispanic	7 (58.3%)	5 (41.7%)	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).

Table XVIII. Stratified Analysis: Epidural by Maternal and Neonatal Characteristics (continued)

	No Epidural	Epidural	P-Value*
Parity			
Nulliparous			
White Non-Hispanic	16 (26.7%)	44 (73.3%)	P=0.11
Hispanic	37 (39.4%)	57 (60.6%)	
Multiparous			
White Non-Hispanic	39 (50.0%)	39 (50.0%)	P=0.07
Hispanic	97 (62.6%)	58 (37.4%)	
Maternal Height			
Less than 62 inches			
White Non-Hispanic	2 (20.0%)	8 (80.0%)	P=0.10
Hispanic	49 (49.5%)	50 (50.5%)	
62 to 66 inches			
White Non-Hispanic	37 (45.7%)	44 (54.3%)	P=0.21
Hispanic	63 (54.8%)	52 (45.2%)	
Greater than 66 inches			
White Non-Hispanic	12 (35.3%)	22 (64.7%)	P=1.00
Hispanic	4 (40.0%)	6 (60.0%)	
Gestational Age			
20 to 36 weeks			
White Non-Hispanic	6 (35.3%)	11 (64.7%)	P=0.62
Hispanic	7 (43.8%)	9 (56.3%)	
37 to 40 weeks			
White Non-Hispanic	43 (43.0%)	57 (57.0%)	P=0.06
Hispanic	102 (54.8%)	84 (45.2%)	
41 to 42 weeks			
White Non-Hispanic	6 (28.6%)	15 (71.4%)	P=0.06
Hispanic	24 (53.3%)	21 (46.7%)	
Provider			
Obstetrician			
White Non-Hispanic	32 (36.8%)	55 (63.2%)	P=0.06
Hispanic	87 (48.9%)	91 (51.1%)	
CNM			
White Non-Hispanic	14 (53.8%)	12 (46.2%)	P=0.09
Hispanic	47 (72.3%)	18 (27.7%)	
Family Practice			
White Non-Hispanic	10 (37.0%)	17 (63.0%)	P=0.41
Hispanic	4 (57.1%)	3 (42.9%)	

* As calculated using Chi-Square or Fisher's Exact Test (when appropriate).