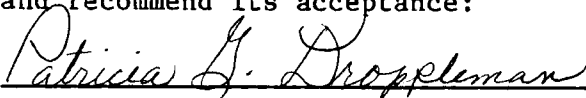


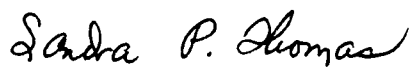
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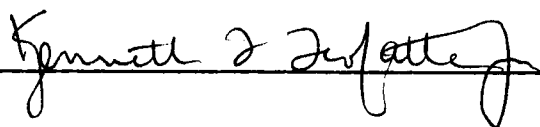
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RISK DISCRIMINATORS RELATED TO THE
INCIDENCE OF PRETERM LABOR OR DELIVERY

A Thesis

Presented for the

Master of Science in Nursing

Degree

The University of Tennessee, Knoxville

Virginia Anne Kramer

May 1990

DEDICATION

To my husband, Cas Kramer, who offered his heart and hand as we worked together in the pursuit of this dream.

To my mother, Alby Turner, who instilled the philosophy that all good things take time.

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ABSTRACT

RISK DISCRIMINATORS RELATED TO THE
INCIDENCE OF PRETERM LABOR OR DELIVERY

Preterm delivery is a major contributor to infant morbidity and mortality in the United States. Unfortunately, the incidence of delivery prior to 37 weeks gestation has remained unchanged for the past five to ten years in Tennessee. Risk assessment, preterm labor prevention programs and early intervention have not been successful in reducing the 16% incidence of preterm deliveries as reported by the Tennessee Perinatal Data Center.

The purpose of this descriptive study was to investigate selected risk factors such as smoking, sexual practices, infection, anemia, perceived stress, reported social support and stated desire for the pregnancy and their correlation to the incidence of preterm labor and delivery. Roy's Adaptation Model provided the theoretical framework for the study.

A non-probability convenience sample was used. Subjects were women who agreed to participate and in the final analysis continued to meet inclusion criteria. Of the 100 subjects, 14 were excluded due to pregnancy complications, fetal anomaly, or other factors; 20% of the final sample experienced preterm labor. Subjects were recruited from four area health departments and the University of Tennessee Medical Center at Knoxville prenatal clinics.

Data collection was conducted over a seven month period and utilized interviews and questionnaire completion. Instruments included the following: Problem Oriented Prenatal Risk Assessment System (POPRAS), Cohen et al.'s Perceived Stress Scale (PSS) and a questionnaire developed by the researcher.

Measures of central tendency and frequency distribution were employed to describe characteristics of the sample. Categorical variables were analyzed using frequency distribution. Correlational analysis was used to test the hypotheses. An Alpha level of $p < .05$ was selected as the level of statistical significance.

There was a significant relationship between urogenital infection and incidence of preterm labor. However, other hypothesized relationships were not supported by the data. Recommendations for nursing practice and future research were offered.

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CHAPTER I

INTRODUCTION

Babies born too tiny and too soon represent a major problem that continues to plague health care providers worldwide. In the United States, the leading cause of perinatal morbidity and mortality is preterm birth (Bragonier, Cushner, & Hobel, 1984). It is estimated that 6% to 10% of all births occur before 37 weeks gestation (Creasy, 1988) and that "90% of low birthweight babies born in the United States are preterm births" (Berman, 1985, p.9). In Tennessee, the incidence of preterm birth remains higher than the national average, as it has for the past five years (Perinatal Data Center for the State of Tennessee, 1989).

Preterm birth is distinguished from low birthweight by definition. The World Health Organization defines preterm birth as the delivery of an infant prior to the completion of the 37th week of gestation irrespective of birth weight (WHO, 1972). In contrast, the growth retarded infant is one of low birthweight (LBW) if the weight is less than or equal to 2500 grams after 36 weeks gestation (Bragonier, et al., 1984). The very low birthweight (VLBW) infant is one with a birthweight of 1500 grams or less (Institute of Medicine, 1985).

In the early 1970's, Emile Papiernik, who is credited (Bragonier et al., 1984) as the first to critically analyze the relationships of multifactoral precursors, began the first of many research endeavors related to preterm labor and delivery. Proposing a method "Le coefficient de risque d' accouchement premature" (1969), Papiernik

suggested that factors related to social variables, past medical variables, and current pregnancy variables would be predictive of those women destined to deliver prematurely. Papiernik's and Kaminski's (1974) work heralded an innovative approach in the assessment and management of women during pregnancy in an effort to decrease the incidence of preterm labor and delivery. Subsequent to Papiernik's work, others have adopted, adapted or modified various risk assessment approaches to guide research and clinical practice in an attempt to lower the incidence of preterm birth.

The current project is an effort to investigate assessment discriminators that identify the woman at risk for preterm labor. Unlike most previous work, this analysis includes women who had preterm labor but subsequently delivered at term (>37 weeks). This study has other distinguishing characteristics from previous projects. These characteristics include recruiting women who were 1) predominantly of a financial status to qualify for Medicaid; 2) considered to be obstetrically low risk; and 3) from both rural and urban areas. The majority of the participants received prenatal care from a nurse in advanced practice.

Overview of the Problem

In the United States, children die at an alarming rate during their first year of life. In 1986, the United States ranked 19th behind many other industrialized nations for infant mortality with a rate of 10.6 deaths per 1,000 live births (U.S. National Center for Health Statistics, 1986). The Tennessee infant mortality rate was reported as 11.5 deaths per 1,000 live births for the same year. The National

Infant Mortality Surveillance reported that "Approximately 40,000 U.S. infants die before reaching their first birthday" (Morbidity and Mortality Weekly Report, 1989). Contributing to these significant and embarrassing statistics, preterm birth and low birthweight are linked phenomena that represent a major health care problem.

The association of infant mortality, low birthweight and delivery prior to 37 weeks gestation is not a new issue. These phenomena have been the focus of health promotion priorities and research for many years. Preterm labor and delivery as a significant problem related to social and personal factors was described as early as 1947 (Eastman, 1947). Shapiro, Schlesinger and Nesbitt (1968) reported that two thirds of the deaths before 28 days of life were related to a birthweight less than 2500 grams. Four of the 13 priority objectives issued by the Surgeon General in 1979 were directed toward (1) reduction of the infant mortality rate (IMR), (2) the reduction of the neonatal death rate, (3) the reduction of the perinatal death rate and (4) the reduction in the incidence of low birthweight (less than 2500 grams) infants. In their 1989 report, Hogue, Strauss, Buehler and Smith reported that the projections that had been made in 1986 correctly forecast that most of the 1990 objectives would not be met.

The lack of progress in the reduction of the incidence of low birthweight (LBW) infants has been offered as an explanation for the failure to meet the goal of reduced infant mortality. Identified as "the most important determinant of infant survival" (Hogue et al, 1989, p. 2), LBW infants accounted for 60% of infants who died in 1980. In 1987, the National Center for Health Statistics (NCHS) reported that the

incidence of live born infants weighing less than 2,500 grams, remained unchanged since 1980. Further, the incidence of live birth infants who weigh less than 1,500 grams has been increasing (MMWR, 1988).

The LBW infant was the focus of the 1985 Institute of Medicine's (IOM) publication which summarized the findings of an interdisciplinary committee's work. Convened "to study the causes and prevention of premature birth and intrauterine growth retardation, the twin contributor to low birthweight" (IOM, 1985, p. 1), the committee concluded that "...the prevention of low birthweight could contribute significantly to a reduction in infant mortality in the United States and, more generally, to improved child health" (p. 1).

According to Hoffman and Bakketeig (1984) preterm births account for between 50 and 70% of all perinatal deaths. McCormick (1985) states that "Within birthweight groups, the risk of mortality is not uniform and varies with gestational age. For a given birth weight, the longer the duration of gestation up to 42 weeks, the lower the mortality" (p. 83). The association of low birth weight and mortality is more readily identified than that of morbidity because the relationships are still being defined (McCormick, 1985).

Multiple problems related to preterm delivery and low birthweight involve both immediate and long term sequelae. Initial physiological adaptation to life involves a delicate balance. Specific pathologic phenomena reported as ramifications of preterm labor and delivery include respiratory distress syndrome (RDS), bronchopulmonary dysplasia (BPD), patent ductus arteriosus (PDA), necrotizing enterocolitis (NEC), hyperbilirubinemia, apnea, intraventricular hemorrhage (IVH), and

retinopathy of prematurity (Brown & Epstein, 1984; McCormick, 1985). These problems only address the immediate physiological response to preterm birth. Stated in terms of nursing diagnoses (Tribotti, 1990) immediate concerns for care during the transition to life include the following: potential for injury related to emergency admission, potential for impaired gas exchange, impaired thermoregulation, alteration in nutrition, potential for fluid imbalance, potential for injury to the brain, eyes, or skin and altered parenting (p. 19).

The cost of survival, estimated at approximately \$1,000 per day for the newborn in intensive care (National Perinatal Association Bulletin, 1989), is an economic burden to the family and society. In general, this cost only describes the immediate care costs. McCormick, Shapiro and Starfield (1980) estimate that 40% of high risk survivors average an additional 16 days of hospitalization during their first year. The IOM (1985) report proposed that school related developmental problems may be an additional sequelae of preterm birth and LBW (p.3). The lifetime impact of this issue remains to be adequately demonstrated.

There is little in the literature, addressing the direct and indirect costs to a family when a baby is born LBW and preterm. Noted as a phenomenon associated with the single, poorly educated, young, and economically deprived (IOM, 1985; Kessel 1984), preterm birth and its related problems is a significant issue. The dollar expense is only one aspect of cost.

An additional indirect cost to the family may be seen in family function and interaction. Previous family relationships and dynamics influence individual responses to a preterm labor or delivery and

subsequent health status of the infant. Johnson (1986) asserts that if the family relationships are inadequate or dysfunctional prior to the delivery of a preterm infant, problems will be compounded after delivery. Even intact families experience the same myriad of adjustments. All families experiencing preterm birth must deal with fears, grief, guilt, and shifting family roles, as well as emotional, physical, and mechanical separation (Johnson 1986, p. 132).

The cost related to preterm labor and delivery are indeed enormous and recognized. As a health care issue the prevention of LBW is receiving much attention:

The prevention of LBW has been identified by the National Institute of Child Health and Human Development as a major research initiative. Research is focusing on mechanisms involved in premature labor and intrauterine growth retardation, evaluation of methods for preventing and treating disorders affecting LBW, and racial and ethnic differences in mortality and LBW (MMWR, 1988, p. 407-408).

As part of this initiative, several major research endeavors have helped to define risk assessment as the basis for preterm birth prevention programs (Creasy, 1988; Herron, Katz, Creasy, 1982; Konte, Creasy & Laros, 1988; Main, Gabbe, Richardson & Strong, 1985; Moore et al, 1986).

According to Herron and Dulock (1987), 6 - 8% of all live births in the United States are preterm (p. 9). Iams, Peacemen and Creasy (1988), report the incidence of preterm delivery to range from 2.4 to 16.3%. These authors also assert that the current risk assessment methods predict only 50% of the women who are destined to deliver preterm. It is significant to note that the focus of most risk assessment is directed toward physiologic and anatomical changes as compared to behavioral or psychosocial issues.

Today, even in the age of advanced technology, the phenomenon of preterm birth and the LBW infant remains a plaguing problem for families and health care providers. Preterm birth is the major contributor to infant mortality in our county and state. The incidence of deliveries prior to 37 weeks gestation has remained unchanged in the United States for the past ten years. Preterm deliveries in Tennessee's Level 3 Regional centers accounted for 16% of all deliveries in 1988 (Perinatal Data Center for the State of Tennessee, 1989). If there is to be any hope of reducing the incidence of preterm birth in the state of Tennessee, it is essential to identify factors that may be related to its high incidence in our population.

Problem Statement

The purpose of this study was to investigate selected risk assessment factors such as smoking, sexual practices, infection, anemia, perceived stress, reported social support and stated desire for the pregnancy and their correlation to the incidence of preterm labor and delivery.

Research Hypotheses

1. Women who have higher perceived stress have a higher incidence of preterm labor or preterm delivery.
2. Women who have higher general social support have a decreased incidence of preterm labor or delivery.
3. Women who have more frequent sexual activity have an increased incidence of preterm labor or delivery.
4. Smoking and anemia have a synergistic impact on the incidence of preterm labor or delivery.

5. Women who have urogenital infections have an increased incidence of preterm labor or delivery.
6. A stated desire for the pregnancy is related to a lower incidence of preterm labor or delivery.
7. Women who perceive higher support from the father of the unborn baby have a lower incidence of preterm labor or delivery

Theoretical Framework

Roy's Adaptation Model

The Roy Adaptation Model (1984) provides the framework for this study. Roy describes the individual as a biopsychosocial being who is constantly interacting within a changing environment. The environment provides or produces both internal and external stimuli. The individual copes through one of two subsystems, the cognator or the regulator subsystem. Coping in the cognator subsystem is accomplished by the expectant woman through processes of perception, information processing, learning, judgment and emotion (Sherwen & Mele, 1986). Contrastingly, in the regulator subsystem, adaptation to the environment occurs automatically through neural-chemical-endocrine processes. Both the regulator and cognator subsystems function in synchrony with one or all the four adaptive modes: physiological need, self-concept, role function and interdependence modes.

The physiological mode deals with the maintenance of physical integrity. Basic biological functions, processes and needs comprise physical integrity. The self-concept mode focuses on the need to maintain psychic integrity; this mode deals with the self appraisal of the physical and personal self. The role function mode focuses on the

need for social integrity. Role function involves or includes the sociocultural definitions of duty and functions within society's demands and expectations. The interdependence mode also is focused upon social integrity. However, interdependence is directed more toward the nature of interpersonal relationships in balance between dependence and independence.

Pregnancy creates a temporary state requiring the woman to accomplish major adaptation in each of the four adaptive modes. The pregnancy in and of itself may become the focal stimulus that creates disequilibrium within the zone of adaptation. The onset of preterm labor represents the body's inability to meet the physiologic demand to maintain the pregnancy. Smoking and anemia as covariables or in isolation may produce an additional adverse focus that initiates maladaptation. As such smoking and/or anemia may create a physiologic imbalance precipitated by the focal stimulus of decreased oxygenation.

As part of self-concept, the expectant mother's feelings and perceptions have the potential to influence her acceptance of the pregnancy, and her self-image. Additionally, the woman's progression through the tasks of pregnancy may be related to self-concept. Inability to accomplish adequate positive self-concept integration may perpetuate stress which in turn may initiate some neuronal mechanism leading to preterm labor.

Self-concept may also be linked to role function. An example of inability to meet role function may be seen especially in the event of the single mother and an unplanned pregnancy. Negative health behaviors such as smoking may demonstrate the woman's inability to fulfill role

function. Such a behavior would demonstrate the inability to meet expectations from health care providers or other society members.

As a final consideration, the interdependence mode is also focused on social integrity. Interdependence in pregnancy requires that the expectant woman assume a symbiotic relationship with the fetus. Preterm labor or delivery may represent the ultimate inability to develop that relationship. Lack of social support systems or inadequate systems could account for the maladaptation or incomplete adaptation.

Roy defines nursing as a science and a practice. Further, she describes nursing as an interactive process. As part of that process, the nurse must first assess the presence of adverse or potentially adverse stimuli, coping behaviors, and influencing factors (Roy, 1984, 42 - 62). Once deficit or excess stimuli are identified, the nurse must utilize the nursing process to facilitate a return to the zone of adaptation through the appropriate nursing diagnosis, plan, implementation and evaluation.

Nominal Definitions

1. Preterm labor - The onset of uterine contractions documented by palpation or electronic monitoring prior to 37 weeks (259 days) gestation that require intervention.

2. Preterm delivery - The delivery of the fetus before the completion of the 37th week of gestation.

3. Anemia - A reduction in the number of circulating red blood cells below acceptable norms or the reduction of oxygen potential below acceptable norms.

4. Infection - The presence or empirical evidence of pathological bacteria, virus, or fungus as noted by observation or report from wet prep, gram stain, culture media.

5. Smoking - The use of a combustible tobacco product.

6. Passive smoking - The individual does not use a tobacco product but is exposed to another's tobacco smoke in the home environment.

7. Smokeless tobacco - Tobacco in its non-combustible state utilized by placement in the mouth.

8. Social support - "...the subjective feeling of belonging, of being accepted, loved, esteemed, valued and needed for oneself" (Pender, 1987).

9. Stress - A relationship between the individual and her environment which is perceived as taxing or exceeding her available resources and represents the existence of danger (Lazarus, 1984).

10. Wanted pregnancy - The pregnancy is planned and desired.

11. Sexual activity - Coitus, oral sex or masturbation.

Summary

The significance of this study can only be measured over time. In focusing on issues related to behaviors and lifestyle, a new direction in risk assessment may be developed. Current practices do not appear to consistently or effectively identify those women destined to deliver preterm. This research will build upon previous endeavors. It will offer new perspectives. This project will provide an added dimension, the risk assessment of the expectant woman from a more holistic approach.

CHAPTER II

LITERATURE REVIEW

This chapter presents literature related to preterm labor and delivery. An overview of previous perspectives is provided in order to focus the present investigation. Various physiologic processes that are associated with pregnancy will be discussed in context with infection, sexual transmission of infection, anemia and smoking. Additionally, social support and stress as they may impact preterm labor and delivery are presented.

Overview

The physiologic or biochemical etiology of preterm labor and delivery remains unidentified although there are several hypothesized theories. The IOM report suggested that complex interactions of the hormonal and metabolic changes in the uterus stimulate a cascade of events leading to preterm labor. Stubblefield (1984) has stated:

Whatever the precise sequence that triggers the onset of cervical softening and uterine contractions, we still lack a hypothesis that will convincingly explain the premature triggering of these events (p. 10).

Animal studies demonstrate that many of the same basic mechanisms occur but the sequence and timing of events is not the same (Stubblefield, 1984). Therefore, the ability to explore the antecedent events involved with the onset of labor using the animal model data is unsatisfactory.

With a limited definitive explanation for the etiology of labor and delivery, investigators have searched for a method to identify women at risk and to propose management techniques to prevent the plaguing

nemesis of perinatal care: preterm birth. Working parallel to Papiernik, Fedrick and Anderson (1976) reported that the risk of spontaneous preterm birth was related to physiologic as well as environmental precursors. Fedrick and Anderson identified low maternal age, maternal smoking, low social class and illegitimacy as some of the factors related to preterm birth. Fedrick & Anderson (1976) analyzed six variables: "age, parity, social class, height, pre-eclampsia and smoking habit..." (p. 352). This risk assessment system did not successfully identify the primagravida at risk.

Several risk assessment protocols have been developed modeled after Papiernik's. Many of the factors in current risk assessment tools focus on phenomena that occur with relative low frequency such as exposure to Diethylstilbestrol (DES), uterine anomaly, second trimester abortions, abdominal surgery, or hydramnios (Creasy & Herron, 1981). In the scoring systems proposed by Creasy and Herron in 1981, low numerical values were assigned to such factors as low socioeconomic status, smoking, low weight gain and work outside the home. Due to the cumbersome nature of the early assessment tools, Holbrook, Laros and Creasy (1988) developed a "Modified Scoring System for Spontaneous Preterm Labor." This particular system described by Iams, Peaceman and Creasy, (1988) includes "Major" and "Minor" risk factors. Again, anatomical and physiologic alterations are the focus of risk parameters. One "major" or two of the "minor" parameters place a woman at risk of preterm labor according to Holbrook et al. (1988). However, other than smoking, there are no environmental risk variables whether physical, psychological, or sociological. Yet, in their analysis of the

Obstetrical Statistical Cooperative data related to over 240,000 deliveries, Kaltreider and Kohl (1980) identified that a low socioeconomic status accounted for 40-60% of all preterm deliveries. In this same analysis, unwanted pregnancies were associated with 6-14% of preterm deliveries and tobacco utilization was associated with 4-14%.

Papiernik, in 1984, emphasized the importance of social factors:

As it is recognized that there is little potential for reducing the established medical factors, we will consider the social factors at greater length, since they offer greater scope for prediction and prevention of preterm delivery (p. 317).

In seeking a balance for risk assessment discriminators, Konte, Creasy and Laros (1988) propose a key point. Based on results of a demonstration project for Northern California, Konte et al. concluded:

Thus, although the screening system was effective in identifying a population at higher-than-average risk of preterm labor, the majority of spontaneous preterm labors (60%) and spontaneous preterm deliveries (64%) in the total population were not in the high-risk group. This points to the necessity of directing preterm birth prevention activities toward the low-risk as well as high-risk populations, and of improving identification of high-risk women (p. 730).

Infection

To better understand the role of infection in preterm labor and delivery, it is necessary to evaluate and identify various pathways that microorganisms enter the uterine cavity. (Romero, Mazor, & Oyarzun, 1988). Polk (1984) identified five mechanisms by which potentially pathogenic organisms gain access into a sterile environment and consequently precipitate preterm labor. First, they can ascend through the vagina and cervix. Subsequently, "Theoretically organisms may pass through microscopic defects in the membranes" (p. 87). Second, organisms can descend through the fallopian tubes. Third, they may

extend from an infected myometrium causing a deciduitis. Fourth, hematogenous transfer through the transplacental route may allow microbes to enter the uterine cavity. Finally, metabolic byproducts produced by the organisms of the host in response to infection may create an environment enhancing the initiation of labor. These routes of microbial access are similar to those reported by Romero et al. (1988).

Romero et al. (1988) reported that indirect evidence supports the premise that the most common route of infection is the ascending route. Chellam and Rushton (1985) and others (Garite & Freeman, 1982; Naeye, 1983) proposed a relationship between congenital infections and chorioamnionitis. The bacteria identified from amniotic fluid are often the same as those commonly found in the genital tract (Gavett, Hummell, Eschenbach, & Holmes, 1986; Pankuch, et al., 1984; Romero et al., 1988). Additionally, a study of twin placentas found that histological chorioamnionitis was most commonly associated with the presenting twin (Naeye et al, 1983).

Romero, Mazor and Oyarzun (1988) proposed a four stage progression in the development of chorioamnionitis. Stage I involves pathogenic overgrowth in the vagina or cervix. Stage II initiates the inflammatory process secondary to the microorganism's ascent into the uterine cavity. The microorganism causes a deciduitis which may be more easily identified by immunofluorescence than by histological exam. Still in Stage II, the pathogen invades the chorion and amnion and/or fetal vessels causing a choriovasculitis. Stage III is initiated by the entry of the pathogenic microbe into the amniotic cavity which marks the

intra-amniotic infection. The final stage, Stage IV, involves the microbial invasion of the fetus through one or more ports such as the oral, ocular, or nasal (p. 98 - 100). Naeye and Blanc (1970) estimated that the overall perinatal mortality attributed to amniotic fluid infections was approximately 6 per 1000 live births.

In the presence of chorioamnionitis, a fetal response to the inflammatory process is evidenced by adrenal hypertrophy. Naeye and Blanc (1970) found the fetal adrenal gland to be 19% heavier in the preterm infant as compared to the term infant at autopsy (p. 557). The adrenals demonstrated "increased cytoplasmic mass of the individual cell in the permanent zone of the gland" (p. 555). Liggins (1969) had previously postulated that the fetal adrenal secretions were involved in the initiation of labor by some undetermined mechanism. Naeye and Blanc (1970) proposed based on their findings that the "...Hyperfunction of the adrenal cell offers a possible mechanism by which infection may initiate labor" (p. 555).

Hameed, Tejani, Verma and Archbald (1984) investigated "silent chorioamnionitis" as a cause of failed arrest of preterm labor. Silent chorioamnionitis would correspond with what Romero et al. (1988) referred to as a subclinical intra-amnionitic infection or the presence of bacteria in the amniotic cavity without overt clinical manifestation of chorioamnionitis (p. 262). Using markers such as maternal serum C-reactive protein, AF white cell count, gram stain, and cultures to identify pathogenic origin, Hameed et al., found an association of silent chorioamnionitis and refractory labor. Those patients who failed tocolysis, (arrest of labor) had twice the incidence of positive

placental histopathological changes as compared to those with successful tocolysis. Their findings supported the premise that one can have a chorioamnionitis without clinical signs. Conversely, a study of 120 women by Duff and Kopelman (1987) failed to replicate Hameed et al's findings. Inherent medical and socioeconomic differences were offered as a possible explanation for the discrepancy.

Sexual Transmission of Pathogens

There appears to be a significant relationship between sexually transmitted disease, infection and the onset of preterm labor. Among the infectious agents which have been implicated in preterm labor are several commonly defined as sexually transmitted. These organisms include chlamydia, gonorrhea, hepatitis B, mycoplasma, group B-streptococcus, hemophilus and syphilis. Although the evidence of a relationship between infection and preterm is formidable, the current risk assessment tools place little consequence on the association between infections of the urogenital tract and preterm labor and delivery (Creasy, 1988; Creasy, Gummer & Liggins, 1980; Muzick, Daikoku and Burnhill, 1980; Mahan, 1985; and Papiernik, 1984). Because sexually transmitted disease is linked to sexual practices it is reasonable to investigate the association of sexual frequency, infection, and preterm labor.

That bacteria or pathogens may ascend through the cervix has been previously described (Polk, 1986; Romero et al., 1988, Toth et al., 1988). The role of cervical mucus as a barrier to bacteria does not appear to be widely studied. One study (Enhorming, Hudlt & Melen, 1970) evaluated barrier capabilities and found that cervical mucous does

manifest bactericidal activity throughout the menstrual cycle (p. 534). The effect, however, is the least significant during the midcycle, ovulation (p.536). The effect in pregnancy is not documented.

Ineffective barrier properties may promote accessibility and survivability for microorganisms. Does the decreased bactericidal activity during ovulation and fertilization allow bacteria to migrate through the cervical mucus and sequester? Change during pregnancy remains to be demonstrated. Minkoff (1983) suggested that the "interaction between a patient's vaginal flora and her local defense mechanisms (antibacterial activity of amniotic fluid and cervical mucous) may help determine who delivers prematurely" (p. 137).

Straus reported in 1961 that antibodies had been found in vaginal secretions. Based on other investigations, Straus stated that these antibodies appear to be formed locally. Referred to as a "muco-antibody" she suggested that the antibody formation provides a rationale for local "effective antimicrobial prophylactic immunity" (p. 617). Further implication of antigen antibody response is noted in the identification of anti-sperm agglutinins found in the cervical secretions in pregnancy (p. 618).

In a recent analysis, McGregor (1987) suggested that the cervicovaginal microorganisms produce a variety of factors or enzymes that allow passage of the pathogens. As part of the inflammatory response, certain bacteria may trigger a release of immunoglobulin A (IgA) specific protease. IgA is present in cervical and vaginal fluid and is noted to be an "important attribute of the mucosal membrane." (p. 6). Proteases produced by bacteria in the immediate

environment may override host defenses found in the mucous plug which normally closes the cervix during pregnancy. Perhaps an ineffective level of neuramic acid acts synergistically with bacterial neuraminidase and mucinase production.

In 1986, Witkin examined "the ability of seminal fluid to induce suppressor cell activity from peripheral blood mononuclear cells" (p. 364). As support for this hypothesis, he reported from the findings of others that seminal fluid demonstrates immunosuppressive properties. Some of these include a reduction of complement activation or reduction in the production of antibodies to T-lymphocyte dependent or independent antigens (p. 364).

Prostaglandins are abundant in seminal fluid. Witkin also evaluated the effect of antibody to prostaglandin E₂ (p. 366). He found using rabbit anti PGE₂ IgG that the ability of seminal fluid to induce suppressor cells was increased by 60% as compared to the controls (p. 367). Further, a recent investigation describes supportive data for Witkin's (1986), immunosuppression and preterm labor and delivery. According to Toth, et al.

...One can speculate that the adverse effect of intercourse on pregnancy outcome manifests itself through a bacterial and immunological mechanism. The combination of semen-induced immune suppression and alteration in cell-mediated immunity associated with pregnancy increases the likelihood that bacteria present in semen will productively infect the female after coitus. (p. 727).

Amnionitis was associated with preterm delivery and the presence of immunoglobulin (IgG) antisperm antibodies in a project reported by Toth et al. (1988). As part of their study, blood was drawn from 193 women during the first prenatal visit. Sperm antibodies were quantified by

enzyme-linked immunosorbent assay (ELISA) developed by Witkin, Richards, Bogiovanni and Zelikovsky in 1983 (Witkin, 1986).

Toth et al. (1988) also indicated three other significant predictors in the etiology of preterm labor that involved an inflammatory process. These include a patient history of intrauterine device (IUD) use, pelvic inflammatory disease and infections as related to an increased number of pathological species present at the time of the first prenatal visit. Toth et al., on the other hand suggests that a pre-existing infection within the uterine cavity is the predisposing element in the progression of amnionitis as related to preterm labor and delivery.

Bacteria are thought to initiate the prostaglandin cascade in chorioamnionitis (Pankuch et al., 1984). There have been several reports that support the role of prostaglandins (PG) related to uterine activity (Casey & McDonald, 1984; Speroff, Glass & Kase, 1983). The particular series of PG associated with preterm labor are PGE₂ and PGF₂ (McGregor, 1987, p.2). McGregor offers support for the role of PG in labor based on the following observations:

1. PG can cause cervical ripening at any gestation.
 2. Increased arachidonic acid concentrations are found in the amniotic fluid of laboring women.
 3. Direct injection of arachidonic acid stimulates labor
 4. Prostaglandin synthetase inhibitors (aspirin, Indomethacin) inhibit labor.
 5. Direct application of PG to the cervix causes contractions
- (p. 2).

McGregor additionally proposes that "fetal membranes are the primary source of arachidonic acid and in conjunction with membrane phospholipids trigger events in the microbial-host interaction leading to preterm labor (p. 2). Bennett, Rose, Myatt and Elder (1987) suggest that abnormal colonization in the "genital tract may lead to an increase in the arachidonic acid metabolism in amnion cells" (p. 649). Bejar, Curbelo, Davis and Gluck (1981) proposed after the analysis of 17 various bacteria that certain microorganisms produce phospholipase (PA2) activity. This activity in turn produces a "deacylation of arachidonic acid from amniotic phospholipids" (p. 479). This is followed by an increase in free arachidonic acid and therefore increased PG production. Lipase disruption of the decidual cell may additionally trigger lysosome release of platelet activating factor (PAF) (McGregor, 1987). PAF has been implicated in the stimulation of PG formation in the amnion tissues and is linked to PLA2 activity according to Ban (1985). Bejar et al. also previously demonstrated PLA2 activity related to genital tract organisms (p. 481).

Stress

Another factor that may be directly or indirectly related to the onset of preterm labor involves the psychosocial dimension. Belief in a holistic or "bodymind" approach mandates further investigation into the role of stress. As pointed out by Lyon and Werner (1987) stress can be categorized as a stimulus, response, or transaction, although some nursing literature on stress is atheoretical.

The stimulus model proposes a focus of disruption. The stimulus stress model states that if there is an increase in multiple life event

changes then one's vulnerability to illness is increased. Holmes and Rahe's research has provided the theoretical framework of this model. The response model defines stress as nonspecific disruptive response which is caused by a "noxious stimulus or stressor" (p. 7). The theoretical framework for the response model is based on Selye's (1956) work and describes a physiologic response, "regardless of the cause, situational context, or psychological interpretation of the demanding situation" (p. 7). Stress categorized as a transaction was described as a "concept that has heuristic value but in itself cannot be measured" (p. 8).

As defined by Lazarus (1966) and Lazarus and Folkman (1984), stress as a transaction involves an integrated dynamic relationship between the individual and their environment. Stress is "but a rubric consisting of many variables and processes" (Lazarus and Folkman, 1984, p. 12). Lazarus and Folkman have identified that the individual's appraisal of a particular event determines if the given environment is taxing or if the stress exceeds available resources. The third component of stress as Lazarus defines it, is the individual's perception and the evaluation of the existence of danger (1988, p. 21).

Appraisal is a key concept of stress, rather than cause and effect, in Lazarus' model. Cognitive appraisal may be either primary or secondary and involves the process of the individuals' categorization of the encounter. Additionally, cognitive appraisal evaluates the various facets of the stress in respect to its significance for well being (p. 53). Lazarus states that people cope with stress by constantly changing cognitive and behavioral efforts in order to manage demands

that are overtaxing to them. Types of coping behaviors can be either emotion focused or problem focused (p. 150). These methods are not mutually exclusive as most individuals use a combination of behaviors.

Lazarus and Folkman (1984) identified three routes by which coping affects health. As proponents of the psychosociobiological etiology of illness, they propose the "Generality Model of Illness" (p. 219). In their theoretical framework coping can influence the frequency, intensify the duration and pattern of neurotransmitter chemical reactions. Secondly, they cite that coping affects health negatively when it involves an excessive use of harmful chemical agents. Finally, Lazarus and Folkman propose that emotion-focused coping impairs health by impeding adaptive health behaviors (p. 215 - 219).

Caplan (1981) defined stress in terms of a discrepancy between demands made and the organism's ability to respond:

... a condition in which there is a marked discrepancy between the demands made on an organism's capability to respond, the consequences of which will be detrimental to the organism's future in respect to conditions essential to its well-being (p. 414).

Further, Caplan proposed that an individual's response to a stressful event occurs within four phases. The first phase involves direct action by the organism in an attempt to reduce the threat or its consequences or manipulation in order to physically escape. Phase two involves the ability of the organism to utilize previously developed skills to enable productive functioning in lieu of a "situation of frustration and confusion" (p. 415). Phase three involves emotional arousal with the development of recognizable feelings of anxiety, anger, grief, or depression for example. Attempted resolution is accomplished through

the utilization of coping mechanisms which may or may not work effectively. It is within this context that Caplan has proposed that support systems facilitate resolution of stress. Phase four in Caplan's schema involves the organism's ability to come to terms with the stressor or the threat to integrity and the subsequent progression through the dynamic process of homeostasis with the environment.

Bragonier, Cushner and Hobel (1984), drawing from Selye's work, define stress as a generalized adaptation:

Stress is a generalized adaptation to any stressor agent, in an attempt to maintain homeostasis within the body. It increases during nervous tension, physical injury, infection, work or any strenuous activity (p. 67).

Described by Selye (1954) as the "General Adaptation Syndrome (GAS)," the response to stress consists of an alarm response followed by adaptation which over time may lead to exhaustion if the stressor is of excessive magnitude or duration. Building on the premise of GAS, Bragonier et al., (1984) propose a multifactorial schema in which various environmental stressors stimulate a cascade of events that ultimately contribute toward preterm labor (p. 66). The variables proposed as significant by the authors included two broad groups: maternal behaviors and personal maternal characteristics. Maternal behaviors included nutritional deprivation, smoking, alcohol, drugs, work, fatigue, change in residence, short pregnancy interval, poor hygiene, and coitus. Personal maternal characteristics included: young or old age, short stature, low prepregnant weight, black race, unmarried status, prior induced abortion, low socioeconomic status, spontaneous rupture of the membranes, and twin pregnancy.

Newton, Webster, Binu, Maskrey and Phillips (1979), using a modified and validated Life Events Inventory, retrospectively studied the relationship of exposure to psychosocial stress and the onset of preterm labor in a group of 132 women during the first four days postpartum. A direct relationship was found between the number of major life events and the onset of preterm labor. It is significant to note that in their analysis, women of the lower socioeconomic class reported twice the number of stressful events as compared to women of higher socioeconomic status. In a later investigation, Newton and Hunt (1984) found that low birth weight and preterm labor were associated with major life events as measured by a modified life events scale. There is little recent research relating stress and pregnancy complications. Beck in 1980 and Crandon in 1979 investigated the relationship of stress to negative outcome. There is little or no research that investigates perceived stress and the incidence of pregnancy complications. Further, statements in the 1985 IOM publication support the need to investigate the link between stress and poor pregnancy outcome.

Social Support

Social support is thought to ameliorate the effects of stress (Antonovsky, 1987; Lazarus & Folkman, 1984). As a phenomenon, social support is not new to our culture or to mankind. Rather, social support has only recently been given its label and definition by social and health care scientists. Flahery and Richman (1986) credit the evolution of the social support concept to multidisciplinary contributions from

the fields of sociology, psychology and anthropology. The anthropological origin of social bonding has been described by Hamburg (1958). As a forerunner to the concept of social support, "social network" was a term introduced to describe group structure by Mitchell (1969).

Interest in the concept of social support per se was stimulated by such authors as Cobb (1976) who described the protective effects of social support for "people in crisis from a wide variety of pathological states" (p. 300). Social support has been described as a moderator (Cobb, 1976), a buffer (Wilcox, 1981), a mediator (Mischel & Fraden, 1987), a predictor (Mercer & Ferketich, 1988), and a "fair-haired child" (Tilden & Galyen, 1987, p. 9) in various studies and reviews that have been conducted since the mid-1970's.

Just as there are many descriptors associated with the concept of social support, there are many general and operational definitions. According to Norbeck (1988) "...agreement has not been reached as to the exact components that should be included in the definition of social support" (p. 87). Development of a unique operational definition for nursing practice is difficult due to the multiplicity and complexity of the social support concept. Simply put, social support might be defined as the dynamic relationship of an individual with others that results in the perception of being loved, esteemed, valued, accepted, guided and cared for without required reciprocity. This definition may be better understood from a retrospective view of the social support concept.

Cobb (1976) provided the earliest definition of social support. In his classic address, Cobb identified that information related to one or

more of three types comprise social support. These include information leading the subject to believe that he:

- 1) is cared for and loved (emotional support),
- 2) is esteemed and valued (esteem support), and
- 3) belongs to a network of communication and mutual obligation (community support) (p. 300 - 301).

Cobb's definition of social support captures the essence of the dictionary and thesaurus usages of the term "support." A general meaning that is shared between sources is the perspective of rendering help or comfort. Approval and endorsement are other common denominators found between definitions. Further, a general connotation in the application of the concept of social support is directed toward positive perspective and health enhancement (Barrera, 1986; Caplan, 1981; Cobb, 1976; Tilden, 1983).

Contrastingly, "the darker side of social support" was presented in a 1987 study conducted by Tilden and Galyen. Others have endorsed the idea that social support may not always promote healthful behaviors or have a positive impact on an individual (Antonucci, 1985; Arronson, 1989). Examples include behaviors such as overprotectiveness, endorsement of alcohol or tobacco use, or assistance which is demeaning.

Conflict support is a phenomenon that occurs in a personal relationship between individuals in which the provider of support is also perceived as a source of conflict. Sandler and Barrera (1984), observed that the stress buffering effect of a social support system was diminished in the presence of conflict support. This situation might be seen during care of the expectant mother in the context of the

parent/child during adolescent pregnancy. For example, overprotectiveness or social isolation may be parental behaviors that interfere with situational/maturational development and task accomplishment.

Barrera has argued that definitions of social support are either too vague or too general and that the intrinsic "concept is in danger of losing its distinctiveness" (p. 414). Despite this perspective, social support concepts can be organized into three broad categories according to Barrera. These include social embeddedness (Antonucci, 1985), perceived social support (Sarason & Sarason, 1985), and enacted support (Barrera, 1986).

Social embeddedness refers to the relationship to significant others within a social environment. Social embeddedness is the antithesis of social isolation or alienation. Initiating with bonding and attachment, it has been suggested that social embeddedness is first learned in direct response to these early interpersonal relationships (Antonucci, 1985).

Attachment and bonding may influence perceived support, which refers to the belief that one is able to obtain assistance or empathy if and when it is needed (Sarason & Sarason, 1985). Perceived social support is often used interchangeably with the terms "social network" and "psychological assets" in the literature. Multiple uses for the same term have contributed to confusion related to the nature of perceived social support. Schaefer, Coyne, and Lazarus (1981) defined social support as the "perception of the supportive values of the social interaction" (p. 382). Further, within perceived social support one

attempts to assess the individual's appraisal of the relationship. Additionally, perceived social support is described as the cognitive appraisal of "being reliably connected to others..." and "...incorporates two dimensions, perceived availability and adequacy of supportive ties..." (Barrera, 1986, p. 416). Tilden (1983) utilized Schaefer et al.'s theoretical framework (1981) in her investigation related to stress, social support and emotional disequilibrium. In this study, perceived social support was defined as one of three types. These included tangible, emotional and informational support.

Perceived social support has many facets and in clinical practice is perhaps the most significant. Schaefer et al. (1981) proposed that perceived social support might be more strongly associated with health outcomes because, "...it is a more direct measure of the support afforded a person" (p. 384). Clinically, it is important to remember that perceived social support may not always be congruent with actual or enacted support.

Enacted support is noted by Barrera as a third category of social support. It is defined as "...actions that others perform when they render assistance to a focal person..." (p. 417). Some might argue that tangible support, as previously discussed, is more appropriately placed in this category. As defined by Schaefer et al. (1981), "tangible support involves direct aid or services and can include loans, gifts of money or goods, and provision of services such as taking care of needy persons or doing a chore for them" (p. 386 - 387). A term comparable to enacted support is received support as defined by Mercer and Ferketich (1988).

Crandon found increased pregnancy complications in women who experienced emotional turmoil. Tilden (1983) found that women with low social support and high life stress experienced increased emotional disequilibrium. The relationship between psychosocial assets has also been investigated (Nuckolls, Cassel & Kaplan, 1972). Nuckolls et al. evaluated the interactive process of social environment and health outcome in what is described by Norbeck (1988) as, "...classic among the studies that predated the use of the term social support" (p. 86). Nuckolls et al. found that women with multiple life crisis and negative psychosocial assets as measured by the Adaptive Potential for Pregnancy Scores (TAPPS) had an increased pregnancy complication incidence.

Lack of social support may be related to preterm labor and delivery. As noted in a 1985 IOM publication, "Unmarried mothers have a consistently higher risk of bearing low birthweight infants than those who are married" (p. 8). One might propose that the lack of an interpersonal relationship with the father of the fetus, an unplanned pregnancy or social isolation may contribute toward the incidence of preterm labor. Further, collective factors associated with low socioeconomic status, may be linked to the lack of adequate social support systems. This in turn may play a role in creating a milieu stimulating preterm labor.

Smoking

Smoking as a behavior correlating with the emancipation of women represents a major concern in women's health care issues. Additionally, smoking is also implicated in reproductive failure, adverse pregnancy outcomes, fetal morbidity and perinatal mortality (Kleinman & Kopstein,

1987; Kleinman, Pierre, Madans, Land & Schramm, 1988). Several studies have demonstrated direct relationships between the incidence of spontaneous abortion, placenta previa, placental abruption, LBW infants and preterm delivery (Berkowitz, 1981, Johnson & Dubin, 1980; Meyer & Tonascia, 1977; Stein & Kline, 1983). Generally, the role of smoking and adverse pregnancy outcome is related to the incidence of the LBW infant and intrauterine growth retardation (IOM, 1985). However, smoking is independently related to preterm birth.

The role of maternal smoking and its association with the incidence of preterm labor has been demonstrated in several studies. In what has been described as a "landmark paper" by Aaronson and Macnee (1988), Simpson (1957) was the first to describe the relationship between smoking and prematurity. Another early investigator, Buncher (1969) evaluated the relationship of gestational age, birthweight and maternal smoking of 20 cigarettes daily. He reported both a 10% lower birth weight and shorter gestation by an average of 28 hours when the expectant woman smoked. In a more recent analysis, Shiono, Klebanoff and Rhoads (1986) reported a 60% increase in the incidence of preterm delivery before 33 weeks when the expectant woman smoked one pack of cigarettes daily. Age, education, ethnicity or any of 11 other assessed characteristics did not contribute to the high incidence of preterm delivery. Guzick, Daikoku and Kaltreider (1984) found that smoking was the one environmental variable identified that could be attributed to preterm delivery. Smoking between 10 and 20 cigarettes daily was associated with 10% of preterm deliveries, and the incidence increased to 13% for 20 or more cigarettes. Further, there was a 20%

increase in preterm delivery prior to 37 weeks in women who smoked as compared to the nonsmoker. According to Myer, Tonascia and Buck (1974) smoking is a significant factor related to preterm labor and delivery. In their analysis, as many as 14% of preterm deliveries may be the result of smoking. This group additionally reported a direct relationship between the number of cigarettes smoked and the risk of perinatal death.

Although the intensive care nurseries provide a better prognosis for the preterm infant than in 1975, the overall rate of preterm deliveries has remained basically unchanged for the past ten years. Equally, many of the associated risk factors such as black ethnicity, low socioeconomic status, youth and limited education have not changed since the early to mid 80's. Further, the demographic information related to smoking behaviors from the late 1960's to the late 1980's has not significantly changed.

The demographics of smoking appear to be related to socioeconomic status. From a review from 1967 thru 1980, Kleinman and Kopstein (1987), report "unmarried women were more likely to smoke than their married counterparts" (p. 823). Married teenagers smoked more than their older married peers. The pregnant black, however, is less likely to smoke than her white counterpart regardless of age. Additionally, these investigators report a direct relationship between educational level and smoking during pregnancy (p. 824).

A 1989 summary suggests that most smoking behaviors have not significantly changed (Williamson, Serdula, Kendrick & Binkin, 1989). Compared to the early 80's, more women today are more likely to stop

smoking during pregnancy. Blacks continue to smoke less than their white peers and are likely to stop smoking. Pregnant women smoked an average of 12 cigarettes per day as compared to the 20 per day of the nonpregnant women (p. 72). Again, the prevalence of smoking was highest among those women who had less education. Thirty-five percent of those women with less than a high school education smoked. However, the incidence of smoking was reduced to 17 percent if the pregnant woman had some college education. These findings are consistent with those of Shiono et al's (1988) analysis of "Smoking and Drinking During Pregnancy, Their Effects on Preterm Birth."

The physiologic effects of smoking are not clearly identified. The cumulative effect of the multiple breakdown products in cigarettes is unknown. Feldman (1985) noted the excessive number of chemicals found in cigarettes:

Cigarette smoke has been estimated to carry between 3,000 and 4,000 chemicals including nicotine, carbon monoxide, thiocyanide, amonia, polycyclic aromatic hydrocarbons, cadmium, plutonium, resins, tars, oxide of nitrogen and vinyl chloride (p. 984).

Individual aspects have been studied (U.S. Department of Health, Education, and Welfare, 1979). Nicotine because of its vasoconstrictive properties is responsible for decreased blood flow to the uterus. The result of generalized vasoconstriction is decreased perfusion within the myometrium. Placentas often demonstrate premature aging and calcification deposition related to decreased perfusion (Van Der Veer & Fox, 1982). Cnattingius, Axelsson, Eklund and Linkmark (1985) proposed that the nicotinic effects were a combination of temporary vasospasm as well as the formation of permanent vessel lesions. Additionally, Asmussen (1980) found that placentas of women who smoke were more

fibrous, smaller and capillary deficient compared to those of women who did not smoke.

The effect of smoking is also seen at the cellular level. In addition to nicotine, other smoking by-products, such as thiocyanide cause a hypotensive state and interfere with cellular function. The end result is reduced oxygen utilization. Potential oxygenation to cells is reduced additionally by carbon monoxide. This reduction is caused because of hemoglobin's higher affinity to carbon monoxide than to oxygen.

Only recently has the issue of passive smoking been brought to light. Passive smoking is defined by Fielding (1985) as "the exposure of nonsmokers to tobacco-combustion products in the indoor environment (p. 495)... and is comprised of "side-stream smoke." According to Fielding, the carbon monoxide of side stream smoke is 10 to 15 volume percent compared to 5 volume percent of main-stream smoke. Main-stream smoke is that which the smoker directly inhales. Side-stream smoke is that which the smoker exhales. A measurable component of side smoke is cadmium which has been found in higher levels in placentas of nonsmoking women (USDHHS, 1979). There is little available research dealing with passive smoking and pregnancy outcome.

Smoking is a factor that is included in several of the risk assessment tools. However, smoking is usually assigned a low numeric value. Further, smoking is considered a risk factor only if the expectant woman smokes 10 or more cigarettes per day. In view of the literature's support, it may be reasonable to consider that smoking is a more significant contributor to preterm labor and delivery than it is

currently ranked. Smoking in relationship to pregnancy outcome is significant enough that one group has proposed the adoption of the "Fetal Tobacco Syndrome" as a diagnostic term (Nieburg, Marks, McLaren & Remington, 1985).

Anemia

Maternal physiologic adaptation to pregnancy occurs within all body systems. Perhaps the system that has the most profound influence related to pregnancy outcome is the vascular. It is the most elemental component, the erythrocyte, that is the central focus. Within the milieu of hemodynamic balance, one must consider the role of the erythrocyte and its oxygen carrying capacity to all the tissues throughout the body. In order to understand the possible relationship of anemia and preterm labor and delivery, one must first consider the several factors related to hemodynamics.

Physiologic adaptation to pregnancy involves dramatic changes within the vascular system. The maternal total blood volume increases up to 50% during pregnancy (McGanity, 1987). Termed "pregnancy induced hypervolemia" this increase is initiated in the first trimester of pregnancy and peaks around 32 to 34 weeks gestation. Additionally, there is a reported increase in the actual erythrocyte size (Celada, 1982). Subsequently, according to Cunningham, MacDonald and Gant (1989), there is a gradual continued rise in blood volume until the last weeks of pregnancy.

The volume change is the result of the increase of both erythrocytes and plasma (Cunningham, et al., 1989). Accelerated production of erythrocytes may involve a 33% increase (p. 141), or 20 -

30% according to McGanity (1987). However, as part of the volume change, the actual hemoglobin and hematocrit levels decrease in normal pregnancy. This accounts for a decrease of blood viscosity causing a plasma hemodilution. The decreased viscosity is temporary as "Hemoglobin, hematocrit and RBC's usually bottom out at 32 - 34 weeks of gestation and increase 6 - 8% by 40 weeks in both supplemented and nonsupplemented pregnant women" (McGanity, 1987, p. 475).

Supplementation refers to oral administration of iron to the pregnant woman. Further, the relative importance of iron is related to the fact that "Most of the body's iron is in haemoglobin..." (Authur & Isbister, 1987, p. 172). Supplementation is commonly practiced during pregnancy as an additional 5 to 7 milligrams (mg) (Finch & Cook, 1984; Pritchard & Scott, 1970) daily is required to meet and maintain adequate iron stores.

Increased iron stores are needed to meet both the maternal and fetal requirements. These requirements are noted in the distribution of iron as described by Authur and Isbister (1987):

A total negative balance of approximately 770 mg occurs throughout the pregnancy ...increased red cell mass 320 mg, fetal iron 300mg, placenta 100mg, uterine myoglobin 50 mg (p. 182).

The relationship of the increased demand for iron during pregnancy was initially investigated in the early 1950's (Cunningham et al., (1989). Previously, studies in the 1920's (Whippel, Robscheit & Hooper, 1920) first identified the relationship of certain food intake and subsequent blood regeneration in dogs. In 1964, Pritchard and Mason investigated the conversion of iron stores to hemoglobin. At the same time, others investigated the nutritional implications as related to

food intake and iron (Finch & Cook, 1984). Reece, Donovan and Pellett (1987) report that iron requirements in pregnancy are "rarely met with dietary intake alone" (p. 1682). This premise is supported by Bently's (1985) comment that the typical western diet contains only 10 mg of iron. For these reasons, iron supplementation during pregnancy is practiced. Non-compliance to iron supplementation coupled with nutritional deficits in the Medicaid population may account for low hemoglobin levels.

As a reflection of iron stores, the average hemoglobin concentration at term according to Pritchard (1965), is reported at 12.5 gm per liter. Physiologic factors that influence hemoglobin levels include many considerations. (1) Total iron binding capacity is usually increased during pregnancy. (2) The usual hemoglobin set point is lower and is reported at approximately 10 - 11 grams per deciliter (Authur & Isbister, 1987). (3) Hemoglobin and transferrin levels are approximately 10% lower in blacks than whites. (4) Weight extremes cause alterations in both hemoglobin and hematocrit values. (5) Nutritional supplementation can result in higher hematologic parameters, however, the normal physiologic decline as the result of hypervolemia is unaffected. (6) Hemoglobin will increase during adolescence independent of pregnancy (McGanity, 1987). McGanity, (1987) additionally reported that anemia or decreased hemoglobin develops:

...as a result of three factors, alone or in combination: (1) inadequate gut absorption and or transport secondary to inadequate dietary intake, poor bioavailability, or malabsorption (excess physiologic demand secondary to maternal and fetal demands: and (3) blood loss (p. 476).

Parameters utilized to define limits for anemia vary. Cunningham, MacDonald and Gant (1989) define a level of less than 11.0 gm per deciliter as abnormal and "...usually due to iron deficiency, rather than to hypervolemia of pregnancy" (p. 141). Data from the Center for Disease Control Pregnancy Nutrition Surveillance System (PNSS) identified values of hemoglobin < 11gm/dL or hematocrit < 33% in the first semester and values of hemoglobin of < 10.5 gm/dL and hematocrit < 32% in the second semester as the definition of anemia (MMWR, 1990, p. 74). Cunningham et al. (1989) state that "...values of a hemoglobin level below 11.0 as probably abnormal" (p. 141).

Commonly, various research endeavors (Dawson & McGanity, 1987; Ulmer & Goepel, 1988) utilized 11mg/dL for hemoglobin limits. Other researchers have chosen to utilize hematocrit values to define anemia. Leiberman, Ryan, Monson and Schoenbaum (1988) used a value of 34% to define anemia related to preterm birth, as did Klebanoff, Shiono, Berendes and Rhoads (1988, 1989).

There are a variety of measures in addition to hemoglobin and hematocrit that can be utilized to assess for iron deficiency anemia during pregnancy. These include measurement of serum ferritin, serum iron and total iron binding capacity. Further, subclassification of anemia can be reflected in the mean cell volume. These classifications include macrocytic, normocytic and microcytic. Although just a screening parameter, hemoglobin and hematocrit values are used to identify anemia because the test is convenient, inexpensive and reports are rapidly available.

The role of anemia in preterm labor and delivery is controversial. Klebanoff et al. (1989) did not find that the effect of anemia was related to the pathogenesis of preterm birth. This confirmed findings by Fedrick (1976). Guzick, Daikoku and Kaltreider additionally did not find anemia to be associated with the predictability of preterm delivery. Neither of these research groups, however, evaluated the covariable effect of anemia and smoking. Lieberman et al. found that a hematocrit level less than 34% "... (or some variable related to it) was found to account for nearly 60 percent of the increased risk of preterm births to black women" (p. 745). In an earlier report, this group found that women with a hematocrit of less than 37% experienced twice the incidence of delivery prior to 37 weeks gestation. Within the context of the present study, smoking and anemia are evaluated in relationship to both hemoglobin and hematocrit.

Summary

In conclusion, the review of the literature suggests some defined precursors such as smoking, clouded issues such as anemia and infection, and some yet to be determined influences related to preterm labor and delivery. The complexity of the problem is multidimensional. The review presents a framework to investigate if there are risk discriminators related to the incidence of preterm labor and delivery. A goal for the present investigation is to improve upon current assessment methods. It is an attempt to elucidate factors that may discriminate woman who are at risk from those who are not.

CHAPTER III

METHODOLOGY

Chapter III describes the design and methodology utilized in this investigation. Research design, research hypotheses, operational definitions, sample, demographics, procedures and instruments are presented.

Research Design

The research design followed a non-experimental descriptive, correlational model. A convenience sample of 100 expectant women who agreed to participate in the study were included. The analysis, however, does not include 100 subjects. Fourteen subjects were excluded from the analysis because they no longer met the inclusion criteria. Table 1 summarizes the exclusion factors.

Subjects were required to be able to speak, read, and write English. At the time of entry, no woman was included if one of the following conditions existed: a known fetal anomaly in the current pregnancy, history of a previous preterm labor or delivery, twin gestation, known fetal intrauterine growth retardation (IUGR), known cardiac disease, pregnancy induced hypertension (PIH), eclampsia, asthma, chronic obstructive pulmonary disease (COPD), sickle cell anemia, Thalassemia or other hemoglobinopathy other than simple iron deficiency anemia, hydramnios, Diethylstilbestrol (DES) exposure, cerclage or identified uterine anomaly. Additionally, women without an early pregnancy test confirmation through the prenatal clinic or a midtrimester (14 - 28 weeks) ultrasound were excluded.

Table 1. Exclusion factors

Exclusion Factor	Number	Percent of total Sample (N=100)	Cumulative Percent
Fetal demise	2	2	
PIH	1	1	3
IUGR	1	1	4
Twin gestation	1	1	5
Fetal anomaly	1	1	6
Placenta previa	1	1	7
Abruption	1	1	8
Molar pregnancy	1	1	9
No delivery data	1	1	10
Moved	2	2	12
Requested removal	2	2	14
Total	14	14	

After exclusion, there were 86 remaining subjects.

All of the participants were women who received their prenatal care at one of five prenatal care centers in the eastern region of Tennessee. The relationship of preterm labor and/or delivery to the variables smoking, anemia, frequency of sexual activity, urogenital infection, perceived stress, social support and the stated desire for the pregnancy was explored.

Hypotheses

1. Women who have higher perceived stress have a higher incidence of preterm labor or delivery.
2. Women who have higher general social support have a decreased incidence of preterm labor or delivery.
3. Women who have more frequent sexual activity have an increased incidence of preterm labor or delivery.
4. Smoking and anemia have a synergistic impact on the incidence of preterm labor or delivery.

5. Women who have urogenital infections have an increased incidence of preterm labor or delivery.

6. A stated desire for the pregnancy is related to a lower incidence of preterm labor or delivery.

7. Women who perceive that they have higher support from the father of the unborn baby have a lower incidence of preterm labor or delivery.

Operational Definitions

1. Preterm labor -- The onset of uterine contractions documented by palpation or electronic monitoring prior to 37 weeks (259 days) gestation, requiring intervention.

2. Anemia -- A laboratory value for hemoglobin of less than or equal to 11 grams/liter, and/or a hematocrit less than 35%

3. Urogenital infection -- At any time during the pregnancy, a report and treatment of a positive culture, gram stain, wet prep from a specimen taken from urine, the cervix, vagina, vaginal vault or external genitalia.

4. Smoking -- The number of cigarettes smoked per day.

5. Passive smoking -- The number of other individuals who live in the same house and smoke.

6. Sexual Activity -- The average number of times per week that the expectant woman reports participating in coitus, masturbation, or oral sex.

7. Desired Pregnancy -- The sum of positive responses during the interview to the questions: Was the pregnancy planned? In general, how do you feel about the pregnancy now? Have you picked out names for the

baby? Have you started buying baby clothes and supplies? The range is 0 - 4.

8. Stress -- The score on the Perceived Stress Scale (Cohen, Kamarck & Mermelstein, 1983). The range of scores is 0 to 56.

9. Father's Social Support -- The sum of positive responses to the following interview questions: Do you still see the father of your baby? Is the father (or significant other) of your baby helpful to you? Does he help you with the household tasks, grocery shopping and alike? Does he do this on a regular basis? Do you feel loved? The range of scores is 0 to 5.

10. General social support -- The sum of responses to the following interview and questionnaire queries: Do you feel unusually alone? Is this most of the time? Do you feel isolated from family and friends? Do you feel loved? Does your family or the baby's father's family provide support and help for you? Do you have friends or people besides the baby's daddy that you can call on for help? List those people who are helpful to you. Use the relationship (i.e. husband, parent, friend). The range of scores is 0 to 11.

Subjects

In this investigation, the 100 subjects recruited for this study were women 15 to 37 years of age who received their prenatal care in either Knox County Health Department, Sevier County Health Department, Roane County Health Department, Scott County Mountain People's Clinic or the University of Tennessee Medical Center - Knoxville (UTMC-K) Resident Clinic. The distribution is presented in Table 2. All subjects were candidates for transfer to the University of Tennessee Medical Center at Knoxville (UTMC-K) if they experienced preterm labor.

Table 2. Distribution of subjects by prenatal care site.

Site	Number	Percent	Cumulative Percent
Knox	43	43	
Sevier	16	16	59
Roane	7	7	66
Scott	10	10	76
UTMC-K	24	24	100
TOTAL	100	100	

There was a relative balance between nulligravid and multigravid women. Primigravidas accounted for 42% of the final sample of 86 women. An additional 17% were women who had had a previous pregnancy loss or termination prior to 20 weeks gestation. Parous women therefore accounted for only 41% of the total sample. The mean gestational age at the time of entry into the study was 25 weeks.

Other demographic parameters assessed include race, age, marital status and educational preparation. Racial distribution demonstrated that the sample was predominantly Caucasian at 82 percent. The remainder of sample was 15% Afro-american, 1% Hispanic and 2% Eurasian. The average age of the subjects was 22 years. In regard to marital status, 46% were married, 7% were an unmarried couple, 31% were single - never married, and the remainder were either divorced or separated (16%). The educational background ranged from 6 to 14 years of education. Women who had less than 12 years of education and were not currently in school accounted for 18% of the sample.

Medicaid health coverage and reimbursement was available for 85% of the subjects. The remainder had applied or would possibly be eligible for Medicaid at a later date. The range of reported monthly income was

\$0.00 to \$1,250. The mean monthly income excluding those women who reported no income was \$588.78. Zero income was reported most often when the expectant woman was an adolescent living at home with her parents. This group accounted for 9% of the total sample.

As a final consideration, smoking demographics are provided. Most of the women (72%) in this sample were exposed to passive smoke. Of the women who smoked, 94% used cigarettes and consumed a mean of 11 cigarettes per day. Two women reported use of chewable tobacco and two other women reported marijuana use after 20 weeks gestation. Only 83% of the sample strongly agreed or agreed that smoking was harmful to their health. The other 17% had no opinion or did not answer the question.

Procedures

The researcher obtained permission to conduct this research from the University of Tennessee Human Subjects Committee (Appendix A), the University of Tennessee Medical Center-Knoxville, (UTMC-K) (Appendix B), Michael R. Caudle, M.D., Chairman for the Department of Obstetrics and Gynecology, (Appendix C), Knox County Health Department (Appendix D), Sevier County Health Department (Appendix D), Roane County Health Department (Appendix F), Scott County Mountain People's Clinic (Appendix G), and Jo M. Kendrick, R.N., Head Nurse for Labor and Delivery UTMC-K (Appendix H). Three perinatologists and several of the obstetricians who render medical supervision in labor and delivery at UTMC-K provided letters of support (Appendix I).

Once all the appropriate permissions had been granted, the researcher initiated subject recruitment. Eligibility for entry into the study included all pregnant women who agreed to participate, inclusive of women under eighteen years of age. When the parent or legal guardian of a woman under 18 accompanied the potential subject to the clinic, the parent was invited to co-sign the informed consent. In view of the "mature minor" ruling as cited in the 1987 Supreme Case of *Cardwell vs. Bechtal*, minors were included in the study without parental consent. The judgment of the "mature minor" was made conjointly by the health care provider and the investigator.

The initial data collection involved several steps. The researcher first contacted the principal director of a prenatal clinic, and data collection days were established. During the course of a regular prenatal care office visit prior to 33 weeks gestation, subjects were invited to participate in this research project. The expectant woman's health care provider or staff member issued the invitation for participation in the study. The prospective participant was then brought to a room where she was introduced to the researcher. The researcher then gave an explanation of the research and obtained a signed letter of consent. The subjects were asked to participate in one interview and to complete a written questionnaire (Appendix J) twice: once that day and again if treatment was required for contractions prior to 37 weeks gestation. Each subject was told that if she was not treated for preterm labor, she would receive a follow-up questionnaire in the mail after 37 weeks gestation. The intent of the follow up questionnaire was to create a situation for a pre-test, post-test

evaluation. The second questionnaire included a cover letter (Appendix K) and offered an incentive of a baby washcloth and erasable note board to mothers completing the follow-up questionnaire. The researcher obtained delivery information through medical record review.

In regard to confidentiality and participation, the subjects were informed that they could refuse to answer any question without penalty. They were told that the information was strictly confidential and that the data would be in the researcher's locked home file. In the event that information was pertinent to health care management, the researcher obtained verbal permission to share the information with the subject's health care provider.

In order to provide a contact source, the researcher provided the subject with telephone numbers. Subjects were informed to call the listed numbers if there were questions, or if they declined further involvement. The researcher received one call from a participant requesting that she be removed from the study. Another subject, admitted to the hospital for preterm labor treatment, requested to be removed from the study.

Instruments

The data collection from the subjects involved both an interview and questionnaire completion. The interview usually lasted approximately 15 to 20 minutes. The researcher formulated the questions following the format of the prenatal form, Problem Oriented Prenatal Risk Assessment System III (POPRAS III) (Appendix L) which is copyrighted. The researcher purchased these forms from POPRAS, Ltd. A panel of nurses and obstetricians verified content validity.

After the interview, each subject completed a questionnaire related to smoking, sexual practices, demographics (Appendix J) and perceived stress (Appendix M). The first section of the questionnaire was developed by the researcher and was reviewed by a panel of nurses and obstetricians for content validity. Both parts of the questionnaire were piloted for clarity and readability prior to actual data collection.

The second section of the questionnaire was a tool developed by Cohen, Kamarack, and Mermelstein (1983) to measure perceived stress. The Perceived Stress Scale or PSS (Appendix M) measures an individual's appraisal of stress. The authors report that this tool is a better predictor of health outcomes than tools such as those which focus on life event scores. The PSS is a 14-item questionnaire designed to measure an individual's perception of predictability, control and manageability in life. The PSS was designed for use with individuals with at least a junior high school education. The authors report an alpha coefficient for reliability at .84, .85, and .86 for three samples (p. 392). The test-retest correlation was .85. Additionally Cohen et al. report concurrent and predictive validity. They report a decreased predictive validity after eight weeks. The PSS does not have a copyright.

As all the data were collected, the researcher assigned a code for management and correlation between initial and follow-up questionnaires, POPRAS and delivery information. Although test-retest analyses were originally planned, poor response rate on the follow-up questionnaire by subjects treated for preterm labor precluded the performance of these

analyses. The data were entered into a dBase III system and then transferred to the VAX Cluster computer system at the University of Tennessee. Data were analyzed using the Statistical Analysis System (SAS), and the analysis is presented in Chapter IV.

CHAPTER IV

RESULTS AND DISCUSSION

Chapter IV presents the research findings. The first section provides the descriptive analysis for the 86 subjects who remained after exclusion criteria were applied. In the next section, each hypothesis is stated, statistical testing presented and results reviewed. Illustration of the findings is presented in tables.

Descriptive Analysis

Table 3 presents the means, standard deviations, and range of scores for each of the numeric variables in this investigation. The number of subjects assessed for each variable varies due to incomplete data.

Table 3. N, Means, Standard Deviation, and Minimum and Maximum Scores for Independent Variables

Variable	N	X	SD	Min	Max
Perceived stress	79	25.77	8.28	0	56
General support	86	7.28	2.47	3	11
Sexual frequency	85	1.15	1.4	0	7
Smoking _a	33	14.66	9.31	0	40
Passive smoke _b	86	1.45	1.46	0	6
Hemoglobin	82	12.19	1.33	8.1	16.3
Hematocrit	85	36.22	3.44	25.8	45.0
White blood cell	71	9.97	3.15	5.3	28.8
Pregnancy desire _c	86	2.26	.89	0	4
Father's support	86	2.56	1.43	0	5

_a Cigarettes smoked per day.

_b Number of other smokers living in the same house.

_c Behaviors and statements that reflect a wanted pregnancy.

There was a normal distribution for most of the variables. However, the variables, white blood cell count, sexual frequency and

perceived stress did not follow normal distribution. These variables have values that may cause an artificial distribution or alter the direction of correlation. For example, only 1% of the WBC was as high as 28.8 whereas the mean for that laboratory value was 9.9. Sexual frequency was most commonly reported as zero. However, 2% of the subjects reported sexual frequency as every day. The perceived stress scale results demonstrate that 5% of the subjects had either very high or very low stress scores.

Tests of the Hypotheses

As previously noted in Chapter III, this study was a descriptive-nonexperimental investigation. The data were treated as interval level and were analyzed using parametric tests. Data analysis was completed through the Statistical Analysis System (SAS). Frequency distributions were computed for analyses of categorical variables, and Pearson product moment correlations were computed to analyze relationships among numeric variables. A probability of $p = .05$ was established as the level of statistical significance.

Hypotheses and Results

Hypothesis 1: Women who have higher perceived stress have a higher incidence of preterm labor or delivery.

Pearson product moment correlation was used to test this hypothesis. This hypothesis proposed that women with perceived higher stress would experience preterm labor. If Cohen et al.'s results were replicated, the Perceived Stress Scale (PSS) would predict those women destined to experience preterm labor. Cohen et al. completed their analysis for their tool using three different subject groups. The mean

score for the present sample (25.77) was comparable to Cohen et al.'s third group of smoking cessation participants. Cohen's group had a mean score of 25.0 (p. 90). Likewise, the standard deviations of this group and Cohen et al.'s were comparable (SD = 8.28, SD = 8.24 respectively).

However, unlike Cohen et al.'s group, the PSS was not predictive of health outcome in the current sample. In this analysis, there was no relationship between higher stress and preterm labor ($r = .061$, $p = .59$). Therefore, the hypothesis was not supported.

Perceived stress, however, is correlated with other parameters within the matrix of assessed behaviors. There is a significant positive relationship ($r = .56$, $p = .004$) between perceived stress and smoking quantity. The basis for this finding is relatively easy to surmise. Feldman (1985) stated that "Nicotine can diminish stress related anxiety, regulate mood by creating a mild state of euphoria and improve performance..." (p. 985). Other pleasure sensations attributed to smoking include relaxation and sedation (USDHHS, 1980).

In addition to smoking, there was an inverse relationship between perceived stress and the stated desire for the pregnancy ($r = -0.27$, $p = .01$). A negative score was an appropriate finding based on the method of the test scoring. Pregnancies were rated on a scale of 0 to 4 with 0 being unwanted and 4 wanted. This relationship is a reasonable finding. Undesired pregnancy may be one of the primary sources of perceived stress.

Hypothesis 2: Women who have higher general social support have a decreased incidence of preterm labor.

The Pearson product moment correlation was used to test this hypothesis. General support referred to those resources available to

the subject exclusive of the baby's father (The father's support was addressed with another scale). The correlation ($r = -.19$) between general social support and a decreased incidence of preterm labor approached significance ($p = .06$). An analysis with a larger sample would probably yield statistical significance. However, in this study, the hypothesis was not supported at the pre-specified alpha level of .05.

The present investigation is consistent with previous research findings. Tilden (1983) found an association between low social support, high life stress and emotional disequilibrium. Wilcox (1981) reported that the quality of social support was more significant than the quantity. In the current study, this perspective was addressed during the interview. Questions were directed to assess the subjects' perceptions of aloneness, lack of love and social isolation. Richardson (1987) also addressed social isolation. She reported that many of her subjects, lacked "people in their lives from whom they could obtain help and support" (p. 213).

Richardson (1987) investigated the relationship between premature labor subjects and perceived quality of parental interaction as a measure of social support. She found a significant ($p = .006$) increase in the incidence of preterm labor when the relationship with the parents was unsatisfactory. Parental interaction was indirectly addressed in this study. The findings of the current study demonstrate a trend supportive of Richardson's.

Hypothesis 3: Women who have more frequent sexual activity have an increased incidence of preterm labor or delivery.

The Pearson product moment correlation was used to test this hypothesis. The frequency of sexual activity had a possible range from 0 to 7. Seven was the equivalent of daily sexual activity or seven times a week. Zero was the equivalent of no sexual activity as represented by the response "Not sexually active right now" or "So long ago that I don't remember." No sexual activity was the most frequent response (N = 28). Many of the women were not in a "relationship" or were no longer seeing the father of their baby. Several women listed the last sexual encounter as the time when they got pregnant. The mean length of time from last sexual encounter was reported as 4.5 days. The mean frequency for sexual activity was once a week. Sexual frequency is presented in Table 4.

Table 4. Sexual frequency

Frequency	N	Percent	Cumulative Percent
Everyday	2	2.4	2.4
Twice a week	18	21.2	23.5
Once a week	26	30.6	54.1
Twice a month	4	4.7	58.8
Once a month	7	8.2	67.1
Not active	6	7.1	74.1
Forgot	22	25.9	100.0
Total	85	100.0	

There was an inverse relationship ($r = -.19$) between the frequency of sexual activity and the incidence of preterm labor. The correlation as a negative value may be best explained by the outliers which may cause artifact. This finding represents one of the situations where the distribution was skewed. The level of significance in this correlation

was $p = .07$. One would anticipate a stronger correlation with a larger sample. However, this hypothesis cannot be accepted on the basis of this sample.

Hypothesis 4: Smoking and anemia have a synergistic impact on the incidence of preterm labor or delivery.

The researcher was unable to test this hypothesis. The subject pool was too small to allow any pertinent statistical analysis. In the total sample, only 38.4% of women continued to smoke during their pregnancy. Further, only eight subjects who were treated for preterm labor were smokers. Of smokers, only three were anemic. However, consistent with previous studies, smoking as a single variable was related to preterm labor in the correlational analyses ($r = .40$, $p = .01$).

The operational definition defined anemia in terms of either below normal hemoglobin or hematocrit levels. Level of hemoglobin did not correlate well ($r = .05$, $p = .63$) with the incidence of preterm labor. Such information is in agreement with Ulmer and Goepel's (1988) premise that low serum ferritin levels were a better predictor of preterm labor than hemoglobin.

However, the relationship between hematocrit and preterm labor approached significance ($p = .09$). A larger sample may have yielded a level of significance. This trend is consistent with Lieberman et al.'s assertion (1988), that low hematocrit is related to preterm labor or adverse pregnancy outcomes.

Hypothesis 5: Women who have urogenital infections have an increased incidence of preterm labor or delivery.

Infection was evaluated two ways within the correlation matrix. First, the relationship of white blood cell count and preterm labor was evaluated. The review of the literature provided evidence that pathological processes could occur without clinical manifestation (McGregor, 1985; Polk, 1984; Toth et al, 1988). As a direct measure of infection, WBC elevation may possibly be present without a positive culture. However, there was no significant correlation ($r = -.01$, $p = .91$) using WBC as a factor. It was the exception when WBC levels were greater than 11 gm/L in subjects experiencing preterm labor.

The second method used to identify infection was to analyze the frequency of infection. Infection reflected identification and treatment of a urogenital infection as documented in the subjects' medical record. The infection may have occurred at any time during the course of the pregnancy. Unlike WBC, the findings related to urogenital infection at any time during the pregnancy demonstrated a significant relationship ($r = .32$, $p = .002$) to the incidence of preterm labor. Thus, hypothesis 5 was supported.

In the present investigation the incidence of infection (44%) was very high. Table 5 demonstrates the overall frequency for infection within the entire sample.

Table 5. Frequency for infection treatment

Infection	N	Percent	Cumulative Percent
Infection	38	44.19	44.19
No infection	48	55.81	100.00
Total	86	100.00	

Table 6 highlights the frequency by type of infection.

Table 6. Frequency by the type of infection

Infection	N	Percent	Cumulative Percent
Candida	8	9.4	9.4
Chlamydia	6	7.1	16.5
Gonorrhea	0	0	16.5
Syphilis	1	1.2	17.7
Gardnerella	8	9.4	27.1
Gm + Cocci	8	9.4	36.5
Urinary Tract	6	7.1	43.6
Herpes	1	1.2	44.8
No Infection	48	56.5	100.0
Total	86	100.0	

Sexually transmitted organisms account for 42% of the infections. Gram positive cocci, most commonly associated with Group B streptococcus, may be classified as sexually transmissible when the organism is present in the urogenital tract. Therefore, the sexually transmitted pathogens may have accounted for 63% of the infections. The findings related to this hypothesis support information previously discussed in the review of the literature.

It was expected that the infection rate might correspond with the increase of sexual activity. However, there was no significant correlation ($r = .05$, $p = .59$) between sexual frequency and incidence of urogenital infection. This finding is probably explained by sexual inactivity. Lack of a monogamous long term relationship may be more of a precursor to infection than the frequency of sexual behavior (Toth et al., 1988).

The review of the literature did not provide a breakdown of urogenital infection frequency such as the information presented in

Table 6. Most references reviewed discussed the specific microbes implicated in the contamination of amniotic fluid, pathogens associated with preterm labor, histological pattern, physiologic processes of bacterial and antibacterial activity or reviewed specific pathogens.

The researcher observed certain trends in infection patterns and the onset of preterm labor. The presence of gram positive cocci was most frequently determined at the time of treatment for preterm labor. In two situations, treatment for a chlamydial infection preceded preterm labor within six weeks. Contrastingly, chlamydia was cultured during the first prenatal visit for the remaining four cases. Vaginal infection exceeded the frequency of urinary infections.

Hypothesis 6: A stated desire for the pregnancy is related to a lower incidence of preterm labor or delivery.

The Pearson product moment correlation test was applied to this question. There was no significant relationship ($r = .14$, $p = .18$) between desire for pregnancy and preterm labor. In this analysis, each subject responded "yes" or "no" to four questions. A score of one was given for each positive response. Frequency analysis of the stated desire for the pregnancy is presented in Table 7.

Table 7. Score frequency for stated desire for pregnancy

Score	Frequency	Percent	Cumulative Percent
0	4	4.7	4.7
1	9	10.5	15.1
2	38	44.2	59.3
3	30	34.9	94.2
4	5	5.8	100.0
Total	86	100.0	

Only a third of the scores reflect a strong association toward desired pregnancy. Only five subjects answered yes to all questions. A positive response to the question, "Was the pregnancy planned?" occurred with only 29% of the subjects ($N = 25$). The low incidence for a planned pregnancy may account for the small number of subjects with a score of four.

There are other factors that may have influenced the scores related to this hypothesis. One factor would have been recruitment intake at an early gestation. Negative responses to the questions "Have you picked out names for the baby?" and "Have you started buying baby clothes and supplies?" would be appropriate for the first two trimesters. Developmental tasks of pregnancy dictate that name selection/discussion and supply purchases are behaviors one expects to see later in pregnancy (Rubin, 1984). Financial restraints might also prevent the expectant woman from buying baby items until closer to term.

Hypothesis 7: Women who perceive that they have support from the father of the unborn baby have a lower incidence of preterm labor or delivery.

There was no significant relationship ($r = -.05$, $p = .61$) for these variables. Therefore, the hypothesis was not supported. The failure to find support for this hypothesis may reflect cultural acceptance of the single parent. The attitude of social disgrace no longer produces the same stigma that was previously associated with being unmarried and pregnant. Further, this finding suggests that other sources of support may be more significant for this particular group of women.

Other findings

Several incidental findings merit discussion. There was a positive correlation ($r = .31$) between father's support and reported sexual

frequency which was significant, $p = .004$. This finding is consistent with what one would expect to see if the expectant woman continues to be involved in a stable relationship.

Although the stated desire for the pregnancy did not have a significant correlation with preterm labor, there was a significant ($r = .32$, $p = .002$) relationship between the stated desire for the pregnancy and father's support. Again, this may reflect several factors that have been previously addressed, such as: 1) an unplanned pregnancy, 2) availability of other support sources or 3) the level of perceived stress.

Summary

Only one of the seven hypotheses was supported at the $p = .05$ level. Hypothesis 5, stating that women who have urogenital infection have a higher incidence of preterm labor or delivery, was supported. Two other hypotheses approached significance but did not achieve the specified .05 level. These were the hypotheses regarding associations between the frequency of sexual activity and preterm labor and between general support and the incidence of preterm labor or delivery. Hypothesis 4 could not be tested because the sample size was insufficient. Summary, conclusions, limitations, and recommendations are presented in Chapter V.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

This investigation has examined the relationship between selected risk assessment variables and the incidence of preterm labor or delivery. New insights were gained into the complexity of interrelationships between the variables and the onset of preterm labor. Many of the findings provide new insights. This chapter provides a summary of the findings, discusses limitations, provides implications for nursing practice and suggests recommendations for future research.

Summary of the Findings

Infection

Only one of the seven independent variables demonstrated a significant relationship ($p = .002$) with the incidence of preterm labor. Hypothesis 5 stated that women who have urogenital infection at any time in the pregnancy have a higher incidence of preterm labor or delivery; this hypothesis was supported. This finding supports Minkoff's assertion that infection does provide "an etiologic factor" (1983, p. 137) in the incidence of preterm labor. The correlation between urogenital infection and preterm labor also supports Kaltreider and Kohl's (1980) and McGregor's (1988) proposal that preterm labor and infection reflect phenomena associated with a lower socioeconomic class since the women in this sample were exclusively from that population.

Sexual activity

In this sample, the frequency of sexual activity was not associated directly with preterm labor. The researcher hypothesized that this lack

of association was due to the large proportion of women who were not sexually active. However, the relationship between frequency of sexual activity and the incidence of urogenital infection activity did closely approach significance ($p = .07$). There was no association between WBC levels and the incidence of diagnosed infection or the occurrence of preterm labor.

Smoking and Anemia

A decision could not be made regarding Hypothesis 4 which stated that smoking and anemia have a synergistic impact on the incidence of preterm labor or delivery. Unfortunately, subject numbers for each group were inadequate to complete statistical tests.

However, individual analysis of the two variables provides some relevant findings. Smoking, as a single factor, was significantly related to the incidence of preterm labor ($r = .40$, $p = .01$). This relationship was an expected outcome based on the review of the literature.

General Support

Hypothesis 2 stated that women who have higher general support have a decreased incidence of preterm labor or delivery. There was a strong trend suggesting that general support was related to decreased incidence of preterm labor. The relationship approached a level of significance ($p = .06$). This finding suggests social support might be an influencing moderator to adverse health outcomes. However, this result is contrary to findings by Norbeck and Anderson (1989). In their study, white women with high support, as defined by scores on the Norbeck Social Support

Questionnaire (NSSQ), also had high incidence of pregnancy complications.

Father's Support

Unexpectedly, the role of father's support was not significant ($p = .61$) in relation to the incidence of preterm labor. Father's or partner's support was the highest predictor associated with lack of pregnancy complication among Blacks in Norbeck and Anderson's study (1989). As expected, father's support was significantly related ($p = .004$) to the frequency of sexual activity. An incidental finding was that the strength of desire for the pregnancy was significantly ($p = .002$) related to father's support. This finding probably indicates that the expectant woman seeks acceptance of the pregnancy from the father of the unborn baby as a reflection of her acceptance as an individual. Without his affirmation, the expectant woman experiences difficulty integrating role function and self-concept as defined by Roy (1984).

Stated desire for the pregnancy

There was no significant correlation between the stated desire for the pregnancy and the incidence of preterm labor or delivery. However, there was a significant ($p = .01$) relationship between undesired pregnancy and high perceived stress. Additionally, there was a very strong association ($p = .002$) between the level of father's support and the stated desire for the pregnancy. A final significant ($p = .05$) association was demonstrated between desired pregnancy and general support.

Perceived stress

Perceived stress was the focus of hypothesis 1 which stated "Women who have higher perceived stress have a higher incidence of preterm labor or delivery." The hypothesis was not supported. This finding contrasts to that of Newton, Webster, Binu, Maskery and Phillips (1979). Newton, et al. found higher levels of stress in women who delivered preterm; however, their assessment of stress was conducted after delivery rather than before delivery. Thus their finding seems to suggest an acceleration of stressful events may account for onset of preterm labor.

Other relationships related to perceived stress were identified. First, women who have high stress are likely to smoke more ($p = .001$), a finding probably related to nicotine's reported pleasurable effects. Further, women have higher perceived stress when the pregnancy is undesired ($p = .01$). Third, perceived stress was lower in situations where the expectant woman had higher general support. In this study, the relationship of perceived stress and general support closely approached a level of significance ($p = .06$). The correlation demonstrated in this research supports the role of social support as a buffer to stress. The fact that this correlation did not reach significance may be due to the sample size. An alternative explanation is that support may also be a source of conflict, as Tilden and Galyen (1987) have described.

Limitations

Interpretation of the results in this study should be made with caution. Several limitations are noted. The first limitation deals

with the sample selection. There was no randomization because the researcher elected to utilize a convenience sample. Time constraints and the obstetric case load at each clinic site made random selection unrealistic. However, the number of participants from each of the clinical sites was representative of the total case load for that site.

Another limitation was the sample size. A high percentage (14%) of the subjects had to be disqualified before the statistical analysis. Although the 100 subjects who were recruited had no pre-existing medical complications and were therefore considered "low risk", 14 developed complications during the course of the pregnancy. This finding may reflect that the economically deprived are intrinsically high risk.

Racial distribution in this study also limits generalizability. Although the racial representation reflects the local community, it would not represent distribution in other areas of Tennessee. Further, the ethnic distribution does not reflect large metropolitan areas across the country where one would find much higher percentages of Afro-Americans, Hispanics, and Asians.

The inability to test hypothesis 4, which queried the synergistic effect of smoking and anemia, was a limitation in this study. It seemed reasonable that decreased oxygen potential, whether by volume or content, would influence the incidence of preterm labor. However, the limited cell size for these variables prohibited analysis. From the standpoint of smoking behavior, it was encouraging to see that many women stopped smoking because they were pregnant. In the total sample only 38.4% of women continued to smoke during their pregnancy. This represented a 24% reduction in the number of smokers.

A final limitation was related to the inability to conduct a test-retest analysis. Although the return rate for the follow-up questionnaire was excellent (65%), the return rate for those who were treated for preterm labor was limited (47%). The poor follow-up return rate reflects that 1) UTMC-K staff members either did not have time or forgot to ask participants if they were in the study, or 2) that the subject declined further involvement in the study.

Implications for Nursing Practice

First and foremost, nurses must recognize the significance of preterm labor as a major health care problem. If specific risk assessment for preterm labor is not currently part of prenatal care, it needs to become as routine as the assessment for pregnancy induced hypertension, gestational diabetes or birth defects.

It is vital to identify those who may be at risk for preterm labor. Further, one must recognize considerations outside the well documented physiologic and anatomic factors associated with preterm labor. The assessment must be holistic. With the exception of urogenital infection, WBC and anemia, this investigation focused on the behavioral and psychosocial dimensions associated with pregnancy and preterm labor.

The nurse must not ignore factors in the patient's personal life. The psychological component of pregnancy may be the most critical aspect in the pathological process contributing to the incidence of preterm labor. The findings from this study suggest that exploratory questions related to general support, father's support, and desire for the pregnancy are relevant.

The relationship of general support to preterm labor approached significance in this study. General support can be easily identified by a few simple questions such as those in this project. Related to father's support, it may be helpful to ask directly if the pregnancy was planned and if the baby's father is supportive. These questions may give clues relative to the acceptance of the pregnancy. Further, the issue of attachment becomes integrated into the dynamics of role attainment when there is no support and the pregnancy is unplanned. In this context the expectant mother may be at risk for delayed attachment to the fetus.

It was interesting to note that only 2% of the sample identified their health care provider as a source of support or someone who was helpful to them. One such subject received prenatal care from a nurse in advanced practice, and the other received care from a physician at the UTMC-K clinic. This finding possibly suggests that nurses do not identify themselves as a resource or that patients perceive support only within a partner, family or friend context.

The nurse needs to recognize that current risk assessment tools place little consequence on the occurrence of urogenital infection. However, the current investigation suggests that in an economically deprived population, one will see a significant number of urogenital infections that may be a precursor to preterm labor or delivery. Careful examination of the urogenital anatomy may identify early signs of an asymptomatic infection. Often, patients do not offer information

unless there is an obvious or painful manifestation of infection. Therefore, it is extremely vital for the nurse to inquire. At each prenatal visit, the nurse should initiate questions that are specifically directed to help the patient recall signs or symptoms suggestive of infection or inflammation.

The nurse's role in patient education is important. Women need to be taught how to identify changes that are suggestive of infection, as well as what to report and when. If the nurse provides rationale, the patient has a reason to be attentive to changes. It is important to identify practices that may contribute to infection such as inappropriate or poor hygiene habits, waiting too long to empty the bladder, or not voiding after intercourse which increases the likelihood of urinary tract infection. Additionally, the nurse might provide information related to general health promotion practices such as proper diet, exercise, rest, smoking cessation, or sexual abstinence if a partner refuses treatment for a sexually transmitted disease.

As noted by previous researchers, risk assessment only identifies 50% of those women destined to delivery early. Consequently, even if one were to add the variables from this investigation, there would probably still be a group of women who remain unidentified. Therefore, as a final consideration for nursing practice, patient education directed specifically toward preterm labor prevention may provide the most effective moderator to the incidence of preterm labor and delivery. Information might include the following: 1) Reasons for concern about preterm labor; 2) Self-care measures that decrease the risk of preterm labor; 3) Effects of prematurity on the baby;

4) Reportable signs of preterm labor; 5) Techniques to palpate contractions; 6) Self-care techniques to utilize before reporting concerns and 7) Who and when to call.

This author contends that films are adequate for educating patients, but direct nurse-patient interaction is better. Films don't answer questions. Audiovisual use alone represents a common trend of machines replacing the individual attention of the nurse.

Suggestions for Future Study

This investigation 1) identified a role for infection as a frequent culprit, 2) confirmed the role of smoking, and 3) suggested low hematocrit and lack of general support as variables that may predict those at increased risk for preterm labor or delivery. If these variables had been integrated into a risk assessment tool, some of the subjects at risk for preterm labor may have been identified. Therefore, further investigation of the significant variables from this study is warranted.

In the current investigation, an impressive number of subjects experienced preterm labor. After exclusion criteria were applied, 20% of this study sample experienced preterm labor. Of the women who were treated for preterm labor, only 4% subsequently delivered after 37 weeks gestation. A comparison between economic groups would help to verify what factors are similar and what are different between economic classes.

Another area for further investigation includes exploration of the synergistic effect of smoking and anemia. Utilizing information derived from this study, hematocrit levels would appear to be a better indicator

of risk status than hemoglobin. In view of the association between perceived stress and smoking behaviors, one might additionally investigate the three variables of smoking, anemia, and perceived stress together.

As a final recommendation for future research, a project evaluating the effectiveness of having the same health care provider deliver most of the prenatal care may provide some new insights. Does it make a difference if the expectant mother consistently sees one primary health care provider? Is this a key element that accounts for differences in outcome between private and clinic patients? Some additional questions to be considered include: What are the nursing behaviors that expectant women perceive as supportive? Do women report suspected preterm labor symptoms earlier when a nurse is available by telephone on a 24 hour telephone basis? Is it effective to have a rotating 24 hour call system?

Summary

Preterm labor and delivery continues to be one of the most significant obstetrical problems we face. Seen as a disease of poverty, preterm labor and delivery is not a problem that will be readily remedied. Nurses can initiate measures that may ameliorate the adverse outcomes associated with social and economic deprivation.

Retrospective analysis of the current investigation affirms Roy's Adaptation Model as an appropriate theoretical model in association with preterm labor. The findings suggest that the overall external environment may provide the precursor stimuli that initiates maladaptation. Infection was the focus of disruption of the expectant

woman's physiologic integrity. Failed arrest of labor and preterm delivery demonstrated the ultimate inability of the host to maintain equilibrium within the zone of adaptations. Contrastingly, a very small percentage of women who experienced preterm labor delivered at term.

Self-concept mode adaptation was demonstrated in the situation of the stated desire for the pregnancy. Many of the subjects whose pregnancies were unplanned nevertheless expressed affirmation for acceptance of the pregnancy. Undesired pregnancy was not associated with an increased incidence of preterm delivery. Therefore, adaptation had occurred. Maladaptation in the self-concept mode could be identified in the relationship of an undesired pregnancy and the higher perceived stress scores. Disruption of a positive self-concept and lack of acceptance of the pregnancy were demonstrated when the expectant mother lacked father's support.

In pregnancy, role function requires that the expectant woman adopt behaviors that foster well-being for themselves and their fetus. Role function as a partner in an intimate relationship was illustrated through increased sexual frequency when the woman had the father's support. Maladaptation existed when the expectant mother continued to smoke. Smoking was associated with preterm delivery. However, role function was facilitated when general support resources were available.

Finally, interdependence mode adaptation was enhanced when the expectant woman had available resources. Perceived stress was lessened with support. Further, as an incidental finding, general support was enhanced when the expectant woman also had the baby's father's support.

In applying Roy's Adaptation Model to practice, it is important that nurses continue to find new approaches that assist all women and their unborn babies to progress to term. Nurses can be instrumental in lowering the incidence of preterm labor and delivery. Assessment is the most crucial phase of the nursing process. It is through the use of a holistic approach in risk factor discrimination that the nurse can begin to facilitate continuation of maternal/fetal adaptation. Nurses must maximize their opportunities to make the difference.

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APPENDIXES

APPENDIX A. Letter of Permission, University of Tennessee

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

May 30, 1989

Office of the
Vice Provost
for ResearchMs. Virginia Kramer
College of Nursing
1200 Volunteer Boulevard
CampusDr. Sandra Thomas
College of Nursing
1200 Volunteer Boulevard
Campus

Dear Ms. Kramer:

The points of clarification you submitted to this office on May 26, 1989, regarding your project entitled "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery," CRP #2994 B, satisfied the concerns of the reviewers; thus, your project has been approved.

This approval is for a period ending one year from the date of this letter. Please make timely submission of renewal or prompt notification of project termination (see item #3 below).

Responsibilities of the investigator during the conduct of this project include the following:

1. To obtain approval from the Committee before instituting any changes in the project.
2. To retain signed consent forms from subjects for at least three years following completion of the project.
3. To submit a Form D to report termination, to renew approval, or to report changes in the project at 12-month or less intervals.

The Committee wishes you every success in your research endeavor.

Sincerely,

A handwritten signature in cursive script, reading "Edith M. Szathmary".

Edith M. Szathmary
Coordinator of Compliancescc: Dr. Sylvia E. Hart
307 Nursing Building
Dr. Johnnie Mozingo

APPENDIX B. Letter of Permission, University of Tennessee Medical Center

THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE



Office of Institutional Review Board
1924 Alcoa Highway
Knoxville 37920-6400
(615) 544-9463

March 31, 1989

Virginia Kramer, R.N.
University of Tennessee Medical Center
at Knoxville
1924 Alcoa Highway
Knoxville, Tennessee 37920

RE: Risk Discriminators Related to the Incidence of Preterm Labor and Delivery
(IRB #0017)

Dear Ms. Kramer:

Thank you for sending our office your changes on the above referenced protocol.

This constitutes full approval of your protocol.

Any further alterations in the protocol must be promptly reported to the University of Tennessee Medical Center at Knoxville Institutional Review Board. In addition, annual reapproval is required by the IRB, and it is the responsibility of the Principal Investigator to initiate the request for reapproval regardless of the time the activity has been approved by the sponsoring agency.

You have individual responsibility for reporting to the board in the event of adverse reactions.

Sincerely yours,

A handwritten signature in dark ink, appearing to read 'Joseph E. Fuhr', followed by a horizontal line.

Joseph E. Fuhr, Ph.D.
Chairman, Institutional Review Board

JEF:ed

APPENDIX C. Letter of Permission, Michael R. Caudle, M.D., Department
Chairman

THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE

Department of Obstetrics
and Gynecology
1924 Alcoa Highway
Knoxville 37920-6999
(615) 544-9306

April 7, 1989

Johnie Mozingo, R.N., Ph.D.
College of Nursing
1200 Volunteer Boulevard
Knoxville, Tennessee 37996-4110

RE: Virginia Kramer, R.N., B.S.N.

Dear Dr. Mozingo:

I am writing to express my support for the research proposal of Mrs. Virginia Kramer entitled "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery." I have reviewed this proposal and find it to be of great value to our department and possibly to medical literature. She has the department's permission to access patients followed at UTM-C-K. Mrs. Kramer is a highly valued member of our department whose academic interest goes well beyond that of the average individual. This particular research may have a significant impact on the obstetrical literature. I support this endeavor wholeheartedly.

Please contact me if you have any further questions.

Sincerely,

Michael R. Caudle

Michael R. Caudle, M.D.
Associate Professor and Chairman
Department of OB/GYN

MRC/mea

cc: Virginia Kramer

Knoxville Unit of The University of Tennessee College of Medicine



APPENDIX D. Letter of Permission, Knox County Health Department

KNOX COUNTY HEALTH DEPARTMENT

KNOXVILLE-KNOX COUNTY REGIONAL OFFICE
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CLEVELAND PLACE
KNOXVILLE, TENNESSEE 37917

March 20, 1989

Mrs. Gini Kramer
403 Moser Lane
Farragut, TN. 37922

Dear Gini,

Dr. Duffy and I have reviewed your proposed research project that you will be doing in prenatal clinics. We feel your investigation will not conflict with clinic function and we will assist you as much as possible.

Sincerely,



Mrs. Jan Kaman, RN/FNPC
Nursing Supervisor

JK/sl

APPENDIX E. Letter of Permission, Sevier County Health Department

SEVIER COUNTY HEALTH DEPARTMENT

TENNESSEE STATE HEALTH AND ENVIRONMENT

COOPERATING

P.O. BOX 4645 / 227 CEDAR STREET

SEVIERVILLE, TENNESSEE 37864

453-1032, 637-6853

March 27, 1989

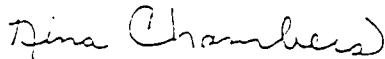
Gina Kramer, RN, B.S.N.
Department of Obstetrics & Gynecology
1924 Alcoa Highway
Knoxville, TN 37920-6999

Dear Gina:

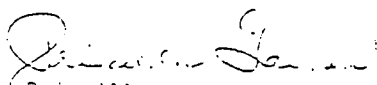
Upon approval of a contract between the University of Tennessee and the Tennessee Department of Health & Environment, students will be allowed to have access to clinical sites. Therefore, as soon as this is done, and after reading the standards you sent, we agree to allow you to have access to the clinical site of Sevier County Health Department for recruitment of subjects from women who are followed in our prenatal clinic. Retrieval of information for your thesis can be done in this manner.

If we can be of any more assistance, please let us know. Good luck with your thesis.

Sincerely,



Nina Chambers, RNC, F.P.N.P.
Sevier County Health Department



Priscilla Garner, RN
Supervisor, Sevier County Health Department

NC:rz

APPENDIX F. Letter of Permission, Roane County Health Department

Roane County
Department of Health & Environment

124 W. Church Street
Kingsston, Tennessee 37763
615-376-5516

April 6, 1989

Jennie Kramer may have access to prenatal patients in Roane County Health Department for purposes of her doctoral dissertation research with the appropriate approval from the East Tennessee Regional Health Office.



Dale Hadden
Nurse Practitioner

APPENDIX G. Letter of Permission, Scott County Mountain People's Clinic

Mountain People's Health Councils, Inc.

BOARD OF DIRECTORS
 JAMES WALKER, CHAIRMAN
 RAY SHENKNER, VICE CHAIRMAN
 ROSEMARY SHARPE, SECRETARY
 RUBY LAWSON, TREASURER
 BILL DUNLAP, PHARMACY DIR.
 WILLIAM S. COOPER III, ATTY
 JENNY GOAD
 HAROLD YOUNG
 ASHLEI LAWSON
 ERNEST LOWE
 HEZEKIAH LOWE
 JOAN SHARPE
 NORMAN C. ACHIS

Mountain People's Maternity Center, Inc.
 P.O. Box 209 — Huntsville, Tennessee 37756
 Telephone (615) 663-2740

JANICE V. LARSON, DIRECTOR
 TIMOTHY F. GARNER, M.D., MEDICAL DIRECTOR
 JOHN E. MCCOLLUM, M.D., FAMILY PRACTICE
 GARY R. PHILLIPS, M.D., INTERNAL MEDICINE
 CONNIE MICKLAZZINI, M.D., OB/GYN
 GARY R. WOODALL, D.D.S.

4/10/89

AREA HEALTH CENTER
 ROUTE 2, BOX 73
 HUNTSVILLE, TN 37756
 BETTY A. ANDERSON, R.N., CNM

STONEY FORN CLINIC
 ROUTE 2, BOX 337
 CARTERSVILLE, TN 37714
 JUDITH C. YANCEY, R.N., CNM

HIGHLAND HEALTH CENTER
 P.O. BOX 155
 ROBBINS, TN 37857
 ADDIE LOU FREYTAG, R.N.

M.P.M.C. DENTAL CLINIC
 P.O. BOX 209
 HUNTSVILLE, TN 37756
 GARY R. WOODALL, D.D.S.

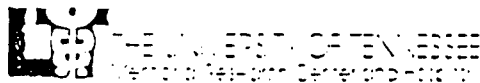
To Whom it May Concern:

Gina Harper, R.N., BSN may recruit women from my prenatal clinic for use in her research project.

I look forward to having her here and will be interested in the final results.

*Sincerely,
 Judith Yancey, R.N., CNM, Cum*

APPENDIX H. Letter of Permission, J. M. Kendrick, R.N.



1524 Alcoa Highway • Knoxville, Tennessee 37920

To: Whom it may concern

From: J. M. Kendrick
Head Nurse, L+D

Gini Kramer has presented a proposal for a research study of preterm labor for our patients. It is a valid study and has L+D nursing support.

APPENDIX I. Letters of Support

THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE

Department of Obstetrics
and Gynecology
1924 Alcoa Highway
Knoxville 37920-6999
(615) 544-9306

March 7, 1989

Johnie Mazingo, R.N., Ph.D.
c/o College of Nursing
1200 Volunteer Boulevard
Knoxville, Tennessee 37996-4110

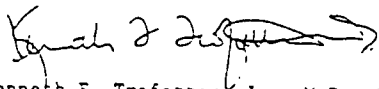
RE: Virginia Kramer, R.N., B.S.N.

Dear Dr. Mazingo:

I have had the opportunity to review Virginia Kramer's research proposal entitled "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery". The proposal is concise, well written, and already demonstrates a considerable research effort on the part of Ms. Kramer. The project itself appears to have well defined goals and should be very "doable" by virtue of the high risk patient population we see on a routine basis at UT Medical Center. If I had any concerns at all, it would be that although we see sufficient numbers of patients with preterm labor, it will take very aggressive enrollment of patients to this study to provide sufficient numbers for evaluation within the time frame indicated. It is my belief, however, that this can and should be done because of the potential value that will be derived from the results of this study. Ms. Kramer has taken a unique approach to this problem and, in my mind, it will be a project that will be worthy of extension beyond the defined time limits required for her masters thesis. If the project proceeds as anticipated, the results will probably represent a significant contribution to the obstetrical literature.

In view of my comments above, I most willingly will serve as one of her project co-directors and look forward to the results of this study.

Sincerely,



Kenneth F. Trofatter, Jr., M.D., Ph.D.
Assistant Professor
Department OB/GYN
University of Tennessee Medical Center
College of Medicine - Knoxville Unit

KFT/mej

Knoxville Unit of The University of Tennessee College of Medicine



THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE

CT

1924 Alcoa Highway
Knoxville 37920-6999
(615) 544-9000

March 31, 1989

Johnnie Mozingo, R.N., Ph.D.
College of Nursing
1200 Volunteer Blvd.
Knoxville, TN 37996-4110

RE: Virginia Kramer

Dear Dr. Mozingo,

I have reviewed the proposal presented for a research project entitled: "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery". This project proposed by Ms. Virginia Kramer is a well planned and valuable project which will most certainly result in publication of a significant paper.

As director of the Regional Perinatal Program I will work to assure access to patients followed in our program here at the University of Tennessee Medical Center at Knoxville. I am hoping that you will be able to assist Ms. Kramer in obtaining approval for this project. I am confident that your efforts will be rewarded.

Sincerely,



Gary E. Kleinman, M.D.
Medical Director
Regional Perinatal Program

GEK/lm

THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE

Department of Obstetrics
and Gynecology
1924 Alcoa Highway
Knoxville 37920-6999
(615) 544-9306

April 3, 1989

Johnnie Mzingo, R.N., Ph.D.
College of Nursing
1200 Volunteer Boulevard
Knoxville, TN 37996-4110

Re: Gini Kramer, R.N., B.S.N.

Dear Dr. Mzingo:

I have had the opportunity to review Virginia Kramer's research proposal entitled "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery". The proposal is concise and demonstrates considerable analysis and research efforts. The research project appears reasonable and to have well defined goals. Preterm labor represents a significant health care problem in obstetrics and is a primary concern. Information derived from this research will be a contribution to literature. I strongly endorse Ms. Kramer's endeavors.

In view of my comments above, I am willing to allow access to the women who I might follow for their prenatal care.

Sincerely,


William H. Hollis, III, M.D.
Assistant Professor
Department of OB/GYN
University of Tennessee College of Medicine
Knoxville Unit

WHH/dj

Knoxville Unit of The University of Tennessee College of Medicine



THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE



Department of Obstetrics
and Gynecology
1924 Alcoa Highway
Knoxville 37920-6009
(615) 544-9306

April 3, 1989

Johnnie Moringo, R.N., Ph.D.
College of Nursing
1200 Volunteer Boulevard
Knoxville, TN 37996-4110

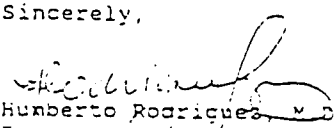
Re: Gini Kramer, R.N., B.S.N.

Dear Dr. Moringo:

I have had the opportunity to review Virginia Kramer's research proposal entitled "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery". The proposal is concise and demonstrates considerable analysis and research efforts. The research project appears reasonable and to have well defined goals. Preterm labor represents a significant health care problem in obstetrics and is a primary concern. Information derived from this research will be a contribution to literature. I strongly endorse Ms. Kramer's endeavors.

In view of my comments above, I am willing to allow access to the women who I might follow for their prenatal care.

Sincerely,


Humberto Rodriguez, M.D.
Instructor
Department of OB/GYN
Director of Pediatric, Adolescent, Young Adult, Obstetrics and
Gynecology
University of Tennessee College of Medicine
Knoxville Unit

HR/dj

Knoxville Unit of The University of Tennessee College of Medicine



THE UNIVERSITY OF TENNESSEE
MEDICAL CENTER AT KNOXVILLE



Department of Obstetrics
and Gynecology
1924 Alcoa Highway
Knoxville 37920-6999
(615) 544-9306

April 3, 1989

Johnnie Mozingo, R.N., Ph.D.
College of Nursing
1200 Volunteer Boulevard
Knoxville, TN 37996-4110

Re: Gini Kramer, R.N., B.S.N.

Dear Dr. Mozingo:

I have had the opportunity to review Virginia Kramer's research proposal entitled "Risk Assessment Discriminators Related to the Incidence of Preterm Labor and Delivery". The proposal is concise and demonstrates considerable analysis and research efforts. The research project appears reasonable and to have well defined goals. Preterm labor represents a significant health care problem in obstetrics and is a primary concern. Information derived from this research will be a contribution to literature. I strongly endorse Ms. Kramer's endeavors.

In view of my comments above, I am willing to allow access to the women who I might follow for their prenatal care.

Sincerely,

A handwritten signature in dark ink, appearing to read 'B. Gleason'.

Brian P. Gleason, M.D.
Instructor
Department of OB/GYN
University of Tennessee College of Medicine
Knoxville Unit

BPG/dj

Knoxville Unit of The University of Tennessee College of Medicine



APPENDIX J. Questionnaire and Letter of Consent

ID#: _____

QUESTIONNAIRE
Smoking, Sexual Practice, Demographic Survey

1. Do you use any type of tobacco? YES ____ NO ____

If you do not smoke or use any tobacco, please go to question 4.

If yes, circle all that apply

A. Cigarettes

B. Pipe

C. Cigar

D. Snuff

E. Chewing tobacco

F. Marijuana

2. What brand do you use? _____

3. How often do you smoke? _____

4. Who else in your household smokes?

A. Husband YES ____ NO ____

B. Boyfriend YES ____ NO ____

C. Mother. YES ____ NO ____

D. Father. YES ____ NO ____

E. Brother (if more than one how many) _____ YES ____ NO ____

F. Sister (if more than one how many) _____ YES ____ NO ____

G. Children. YES ____ NO ____

H. Other - aunt, uncle, etc. YES ____ NO ____

If you do not smoke and have answered #4, go to question 15

5. Do you share the same packages of cigarettes or other tobacco with other household members? YES ____ NO ____

6. Do you inhale when you smoke?YES ____ NO ____
7. When do you smoke?
- A. Getting out of bedYES ____ NO ____
- B. After meals. Breakfast ____ Lunch ____ Dinner ____ Snack ____
- C. With a cup of coffee/soda.YES ____ NO ____
about how often each day ____
- D. Talking on the phoneYES ____ NO ____
about how often each day ____
- E. Visiting with friends.YES ____ NO ____
about how often each day ____
- F. When you are boredYES ____ NO ____
about how often each day ____
- G. When you are nervousYES ____ NO ____
about how often each day ____
- H. When you feel stressed or upset.YES ____ NO ____
about how often each day ____
- I. After intercourse.YES ____ NO ____
8. How do you buy your cigarettes/tobacco?
- A. Package at a time
- B. Carton at a time
9. How much do you think you spend a week on smoking for yourself?
- \$5 ____ \$10 ____ \$15 ____ \$20 ____ \$30 ____ \$40 ____
10. About how many cigarettes do you smoke in a day?
11. Have you ever tried to stop smoking?YES ____ NO ____
12. Has a doctor or nurse or other person suggested
that you stop smoking?YES ____ NO ____

13. Do you think that smoking is harmful to your health?

Strongly agree ___ Agree ___ No Opinion ___ Disagree ___ Strongly Disagree ___

14. Do you think that smoking affects the growth of your baby?

Strongly agree ___ Agree ___ No Opinion ___ Disagree ___ Strongly Disagree ___

SEXUAL PRACTICE

15. When was the last time you had sex? _____

16. How often do you usually have sex? Circle only one.

A. Every day

B. Every other day

C. Once a week

D. Twice a month

E. Once a month

F. So seldom that you forget

G. Not sexually active right now

17. What sexual practice do you usually use the most often? Circle only one.

A. Penis/vagina

B. Masturbation

C. Oral Sex

D. Other

18. Does your partner ever use a condom (rubber) now that you are pregnant?

A. Always

B. Sometimes

C. Never

19. Do you have more than one sex partner? YES ___ NO ___

20. Is your current partner the father of your baby? YES ___ NO ___

21. When your partner is available, about how often do you have sex in a week? _____

22. Do you ever have sex more than once in a twenty-four (24) hour period?

YES ___ NO ___ Times ___

23. Have you had sex in the past twenty-four (24) hours? YES ____ NO ____

How many times? _____

DEMOGRAPHIC SURVEY

24. What is your age? _____

25. What is your present marital status?

A. Never married

B. Married/remarried

C. Divorced

D. Separated

E. Widowed

F. Unmarried couple

26. Do you live with the father of your baby? YES ____ NO ____

27. How long have you lived with the father of your baby? YEARS ____ MONTHS ____

28. If divorced or separated, do you see or talk to the father of your baby?

Number of Times ____ Daily ____ Weekly ____ Monthly ____ Never ____

29. Is he helpful to you? YES ____ NO ____

30. What is your ethnic background?

White ____ Black ____ Asian ____ American Indian ____ Hispanic ____ Other ____

31. How many years did you go to school? _____

32. Are you in school now? YES ____ NO ____

33. What was your family's total income last year? _____

34. Are you presently eligible for Medicaid? YES ____ NO ____

DON'T KNOW ____

35. Do you have private insurance? YES ☐ NO ☐
Does it cover pregnancy? YES ☐ NO ☐
36. Will you be eligible for Medicaid after your medical bills
reach a certain level (Spindown)? YES ☐ NO ☐
37. Are you receiving extra food from WIC? YES ☐ NO ☐
38. Are you receiving food stamps? YES ☐ NO ☐
39. Have you applied for WIC? YES ☐ NO ☐
40. Have you applied for Medicaid? YES ☐ NO ☐
41. Are you currently employed outside the home? YES ☐ NO ☐
42. How many hours per week do you work? _____
43. List those people you think are the most helpful to you. Do not use the name
of the person. State their relationship to you, for example: Parents

Dear Expectant Mother:

You are invited to be in a research study. The study is being conducted by a registered nurse who specializes in the care of pregnant women. The research is supervised by faculty of the University of Tennessee at Knoxville College of Nursing since the researcher is presently a graduate student. The research will look at factors that could influence early labor or delivery. The study will provide information to help other pregnant women in the future. The benefit of this research may be the birth of fewer babies who are born too early or too small.

You will be asked to answer some questions in an interview and to fill out a questionnaire. This should take about 50 minutes. You will be asked to do the questionnaire again later on. Your medical record will be reviewed to obtain laboratory information, medical information, and delivery information related to your past and/or current pregnancy. You may refuse to answer any question. You may drop out of the study any time. Your participation is VOLUNTARY. Your decision to be in the study will not influence the care you receive.

All of the information will be kept confidential. You will be given a special code, and your name will not be on any form other than the permit. The information will be kept in a locked file in the researcher's home. Only the researcher will have access to the file. The results of the study may be published but will not identify you in any way.

If you have any questions or want to know the results of the study, you may contact the nurse researcher or her thesis chairperson who are listed below.

Gini Kramer

Gini Kramer, B.S.N., R.N.
UTK Master's Candidate
403 Moser Lane
Farragut, Tennessee 37922
(615) 966-4885

Johnnie Mazingo

Johnnie Mazingo, Ph.D., R.N.
Associate Dean for Undergraduate Studies
College of Nursing
Knoxville, Tennessee 37996
(615) 974-4151

I have read and understand these statements. I give my permission to be part of this study. I also give permission for the nurse researcher to look at and to use information from my medical record.

Signed _____

Date of Birth: _____

Date: _____

Legal Guardian: _____

Date: _____

APPENDIX K. Cover Letter

Dear Expectant Mother,

Enclosed is the second questionnaire for the preterm labor study, a pen and a stamped envelope.

Please take a few minutes to do the questionnaire, place it in the stamped envelope and drop it in the mailbox. When I receive the questionnaire, I will mail you a small gift for your baby.

If your baby has been born, please answer the following questions.

What was your due date?

What was your baby's date of delivery?

Where was your baby delivered?

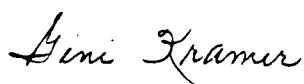
Name of the hospital.

Did you have any problems before the delivery?

Did you have to go to the hospital for those problems?

Again, I would like to thank you for your willingness to be part of my research project.

Sincerely,

A handwritten signature in cursive script that reads "Gini Kramer".

Gini Kramer, B.S.N., R.N.

Street Address, City, State, Zip Code				(County)	
Preferred Language		Home Phone () Contact Phone ()		Contact Person	
PATIENT				FATHER of the FETUS	
☐ Married ☐ Single ☐ Widowed ☐ Divorced ☐ Separated ☐ Unwed Couple				Name _____ Age _____ ☐ Husband ☐ Other _____	
RACE		ETHNICITY		RELIGION	
☐ White ☐ Black ☐ Asian ☐ Am Indian ☐ Other		☐ White ☐ Black ☐ Asian ☐ Am Indian ☐ Other		☐ Hispanic ☐ Other	
BIRTHPLACE		BIRTHPLACE		BIRTHPLACE	
EDUCATION		EDUCATION		EDUCATION	
Years _____ Degrees _____		Years _____ Degrees _____		Years _____ Degrees _____	
Title-Type _____		Title-Type _____		Title-Type _____	
Location _____ ☐ Full ☐ Self ☐ Part ☐ Unempl		Location _____ ☐ Full ☐ Self ☐ Part ☐ Unempl		Location _____ ☐ Full ☐ Self ☐ Part ☐ Unempl	
OCCUPATION		OCCUPATION		OCCUPATION	
Carrier-Program _____ Policy-ID # _____ Group # _____ Insured _____		Carrier-Program _____ Policy-ID # _____ Group # _____ Insured _____		Carrier-Program _____ Policy-ID # _____ Group # _____ Insured _____	
INSURANCE		INSURANCE		INSURANCE	
☐ Private ☐ HMO ☐ Public ☐ None		☐ Private ☐ HMO ☐ Public ☐ None		☐ Private ☐ HMO ☐ Public ☐ None	
PAST PREGNANCIES					
DATE		EARLY LOSS or TERMINATION		WEEKS GEST	
Month - Year		Month - Year		Month - Year	
LIVE or STILLBORN (≤ 20 weeks)		LIVE or STILLBORN (≤ 20 weeks)		LIVE or STILLBORN (≤ 20 weeks)	
Age of Death _____ Sex _____		Age of Death _____ Sex _____		Age of Death _____ Sex _____	
VAGINAL		VAGINAL		VAGINAL	
Spont. Vix _____ Breech _____ Forceps _____		Spont. Vix _____ Breech _____ Forceps _____		Spont. Vix _____ Breech _____ Forceps _____	
CESAREAN		CESAREAN		CESAREAN	
C/S _____ F/S _____ A/S _____ R/S _____		C/S _____ F/S _____ A/S _____ R/S _____		C/S _____ F/S _____ A/S _____ R/S _____	
PROBLEMS and or COMMENTS		PROBLEMS and or COMMENTS		PROBLEMS and or COMMENTS	
Delivery Site _____		Delivery Site _____		Delivery Site _____	
*MAB (Missed Ab) M (Molar) D&C S (Suct) D&E VP (Vag PG) AF Inf H (Hysterotomy) **S (Stillbirth) N (Neonatal) I (Infant) C (Childhood)					
HISTORICAL PROBLEMS					
AGE		AGE		AGE	
≤ 17 ≥ 35		≤ 17 ≥ 35		≤ 17 ≥ 35	
ABORTION		ABORTION		ABORTION	
☐ Induced ☐ Recurrent Spontaneous (R) _____		☐ Induced ☐ Recurrent Spontaneous (R) _____		☐ Induced ☐ Recurrent Spontaneous (R) _____	
PETAL GROWTH		PETAL GROWTH		PETAL GROWTH	
☐ SGA ☐ LBW ☐ LGA ☐ Macrosomia		☐ SGA ☐ LBW ☐ LGA ☐ Macrosomia		☐ SGA ☐ LBW ☐ LGA ☐ Macrosomia	
DEATH		DEATH		DEATH	
☐ Fetal ☐ Neonatal ☐ SIDS ☐ Other _____		☐ Fetal ☐ Neonatal ☐ SIDS ☐ Other _____		☐ Fetal ☐ Neonatal ☐ SIDS ☐ Other _____	
BIRTH		BIRTH		BIRTH	
☐ Neural Tube ☐ Other _____		☐ Neural Tube ☐ Other _____		☐ Neural Tube ☐ Other _____	
DEFECT		DEFECT		DEFECT	
☐ Chromosomal Abnormality		☐ Chromosomal Abnormality		☐ Chromosomal Abnormality	
MORBIDITY		MORBIDITY		MORBIDITY	
☐ RDS ☐ Infection ☐ Neuro-Development ☐ Chronic Condition ☐ Neonatal Jaundice		☐ RDS ☐ Infection ☐ Neuro-Development ☐ Chronic Condition ☐ Neonatal Jaundice		☐ RDS ☐ Infection ☐ Neuro-Development ☐ Chronic Condition ☐ Neonatal Jaundice	
DURATION OF GESTATION		DURATION OF GESTATION		DURATION OF GESTATION	
☐ Preterm Delivery ☐ Postterm Delivery		☐ Preterm Delivery ☐ Postterm Delivery		☐ Preterm Delivery ☐ Postterm Delivery	
CESAREAN BIRTH		CESAREAN BIRTH		CESAREAN BIRTH	
☐ Low Transverse ☐ Low Vertical ☐ Classical ☐ T-Incision ☐ Unknown ☐ Hysterotomy ☐ Prior VBAC		☐ Low Transverse ☐ Low Vertical ☐ Classical ☐ T-Incision ☐ Unknown ☐ Hysterotomy ☐ Prior VBAC		☐ Low Transverse ☐ Low Vertical ☐ Classical ☐ T-Incision ☐ Unknown ☐ Hysterotomy ☐ Prior VBAC	
HEMORRHAGE		HEMORRHAGE		HEMORRHAGE	
☐ Previa ☐ Abruptio ☐ Other 3rd Trimester ☐ Postpartum ☐ DIC ☐ Transfusion		☐ Previa ☐ Abruptio ☐ Other 3rd Trimester ☐ Postpartum ☐ DIC ☐ Transfusion		☐ Previa ☐ Abruptio ☐ Other 3rd Trimester ☐ Postpartum ☐ DIC ☐ Transfusion	
PREG-INDUCED HYPERTENSION		PREG-INDUCED HYPERTENSION		PREG-INDUCED HYPERTENSION	
☐ Hospitalized ☐ Early Delivery (at wk) ☐ Intrapartum Only ☐ Eclampsia ☐ DIC		☐ Hospitalized ☐ Early Delivery (at wk) ☐ Intrapartum Only ☐ Eclampsia ☐ DIC		☐ Hospitalized ☐ Early Delivery (at wk) ☐ Intrapartum Only ☐ Eclampsia ☐ DIC	
HISTORY OF INFERTILITY		HISTORY OF INFERTILITY		HISTORY OF INFERTILITY	
Duration: ☐ Primary ☐ Secondary ☐ Rx: ☐ Ovulation Induction ☐ Other Meds ☐ IVF/Gift ☐ Surgery		Duration: ☐ Primary ☐ Secondary ☐ Rx: ☐ Ovulation Induction ☐ Other Meds ☐ IVF/Gift ☐ Surgery		Duration: ☐ Primary ☐ Secondary ☐ Rx: ☐ Ovulation Induction ☐ Other Meds ☐ IVF/Gift ☐ Surgery	
STRUCTURAL ABN		STRUCTURAL ABN		STRUCTURAL ABN	
☐ DES Stigmata ☐ Anomaly (or Corrected) ☐ Incompetent Cx (or Carriage ☐ Remains In Situ)		☐ DES Stigmata ☐ Anomaly (or Corrected) ☐ Incompetent Cx (or Carriage ☐ Remains In Situ)		☐ DES Stigmata ☐ Anomaly (or Corrected) ☐ Incompetent Cx (or Carriage ☐ Remains In Situ)	
Diag D&C ☐ Abn PAP ☐ Rx: ☐ Conization ☐ Myoma ☐ Myomectomy ☐ Other Gyn Surgery		Diag D&C ☐ Abn PAP ☐ Rx: ☐ Conization ☐ Myoma ☐ Myomectomy ☐ Other Gyn Surgery		Diag D&C ☐ Abn PAP ☐ Rx: ☐ Conization ☐ Myoma ☐ Myomectomy ☐ Other Gyn Surgery	
URINARY TRACT INFECTION		URINARY TRACT INFECTION		URINARY TRACT INFECTION	
☐ Cystitis ☐ Pyelonephritis ☐ Asymptomatic Bacteriuria ☐ Recurrent Episodes		☐ Cystitis ☐ Pyelonephritis ☐ Asymptomatic Bacteriuria ☐ Recurrent Episodes		☐ Cystitis ☐ Pyelonephritis	

PHYSICAL EXAM and PROBLEMS			
Height	Weight	Blood Pressure	Pulse
Findings		Findings	
SKIN	BACK		
HEENT	EXTREMITIES		
MOUTH/TEETH	NEUROLOGIC		
THYROID	VULVA/VAGINA		
HEART	CERVIX		
LUNGS	UTERUS		
BREASTS/NIPPLES	ADNEXA		
ABDOMEN	RECTUM		
UTERINE SIZE/CLINICAL DATING / ☐ Compatible ☐ Smaller ☐ Larger			
PELVIS ☐ Adequate ☐ Borderline ☐ Inadequate			
131	ANATOMIC	STATURE (< 62 inches or < 152 cm)	
132		WEIGHT ☐ Clinically Obese ☐ Clinically Underweight	
133		CARDIOVASCULAR ☐ BP ☐ Heart Murmur ☐ Varicosities	
134		ABDOMINAL ABNORMALITY	
135		ANOMALY/PHYSICAL HANDICAP	
136		☐ Size-Date Discrepancy ☐ Adnexal Mass ☐ Abnormal Pelvimetry ☐ Myoma ☐ Structural Abnormality ☐ Other	
137		OTHER FINDINGS (Specify)	
Additional Comments:			

Pre- Tx	+	NUTRITION PROBLEMS	
151	HISTORY	PRE-GRavid WEIGHT FOR HEIGHT ☐ < 90% of standard ☐ > 120% of standard	
152		SHORT PREGNANCY INTERVAL (< 1 year)	
153		ANEMIA ☐ Iron Deficiency ☐ Folate Rx	
154		METABOLIC DISORDER ☐ PKU ☐ Galactosemia ☐ Other	
155		ABUSE OF VITAMIN/MINERAL SUPPLEMENTS	
156	EATING PATTERNS	NON-FOOD ITEMS ☐ PICA ☐ Other	
157		MEALS ☐ Skips > 3 per week ☐ Frequent Fasts ☐ Binges	
158		DISORDERS ☐ Anorexia Nervosa ☐ Bulimia ☐ Other	
159	DIGESTION	☐ Pyrosis ☐ Diarrhea ☐ Constipation ☐ Heartburn ☐ Anorexia ☐ Frequent Vomiting	
160		ALLERGY/INTOLERANCE ☐ Dairy ☐ Milk only ☐ Other	
161	DIET	INADEQUATE ☐ Protein ☐ Calcium ☐ Calories ☐ Other	
162	INTAKE	EXCESSIVE ☐ Refined Carbohydrates ☐ Fats ☐ Other	
Additional Comments:			

Pre- Tx	+	PSYCHOSOCIAL PROBLEMS	
181	EXPOSURE- HABITS	☐ Multiple Partners ☐ Passive Smoke ☐ Radiation ☐ Organic Solvents ☐ Heavy Metals ☐ Cat Litter ☐ Raw Meat ☐ Other	
182		Patient: ☐ Tobacco ☐ Alcohol ☐ Marijuana ☐ Cocaine ☐ IV Drugs ☐ Methadone Program ☐ Other	
183	IMPAIRMENT	Partner: ☐ Tobacco ☐ Alcohol ☐ Marijuana ☐ Cocaine ☐ IV Drugs ☐ Methadone Program ☐ Bingeal ☐ Other	
184		☐ Visual ☐ Hearing ☐ Speech ☐ Learning ☐ Physical ☐ Language/Cultural Barriers to Care	
185	ACTIVITY	EXCESSIVE ☐ Standing ☐ Lifting ☐ Climbing Stairs ☐ Recreational Exercise ☐ Commuting ☐ Traveling ☐ Fatigue	
186		WORK ☐ ≥ 2 Pre-school Children ☐ Inadequate Help ☐ Long Hours ☐ Operates Heavy Equipment ☐ Other: ☐ Heavy Housework ☐ Inability to Rest ☐ Swing/Rotating Shifts ☐ Vibrating Equipment	
187	LIFE EVENTS- STRESSORS	RECENT LOSS ☐ Partner (☐ Abandonment ☐ Separation/Divorce ☐ Death ☐ Other) ☐ Parent ☐ Child ☐ Other	
188		HOUSEHOLD ☐ Handicapped Member ☐ Serious Illness ☐ Recent/Anticipated Move ☐ Add/Subtract Family Member ☐ Other	
189		JOB ☐ Loss/Threatened Loss ☐ Conflict ☐ Disability ☐ Transfer/Change: School ☐ Change ☐ Quit	
190		VIOLENCE/ABUSE ☐ Patient (☐ Past Hx ☐ Recent): ☐ Physical ☐ Rape/Sexual ☐ Mental ☐ Crime Victim ☐ Children	
191	SOCIAL SUPPORT	OTHER ☐ Unplanned Preg ☐ Undesired Preg ☐ Financial ☐ Incarceration (☐ Patient ☐ Partner) ☐ Catastrophic Event	
192		☐ Feels Alone ☐ Feels Unloved ☐ Lack of Social Contacts ☐ Conflict (☐ Partner ☐ Parent ☐ Child ☐ Other)	
193	FEARS- ANXIETIES	INADEQUATE RESOURCES ☐ Food ☐ Shelter ☐ Medical ☐ Financial ☐ Transportation ☐ Telephone ☐ Infant Supplies	
194		☐ Self Health ☐ Fetal Condition ☐ Preg Complications ☐ Surgery ☐ Perinatal Loss ☐ Infant Morbidity ☐ Other: ☐ Personal Safety ☐ Early Preg Loss ☐ Hospital ☐ Anesthesia ☐ Labor/Delivery ☐ Infant Attachment	
195	EMOTIONAL PSYCH	☐ Feels Depressed ☐ Grieving ☐ Eating Disorder ☐ Suicide Ideation/Attempt ☐ Chronic ☐ Meds ☐ Other ☐ Inability to Cope ☐ Sleep Disturbance ☐ Severe Phobia ☐ Postpartum Depression Condition: Rx: ☐ Hosp'd-Date	
Additional Comments:			

IMMUNIZATIONS ☐ Current DT-Date ☐ Rubella Protected-Date ☐ Other	
MEDS SINCE CONCEPTION	
ALLERGIES ☐ Drug ☐ Food Intolerance ☐ Other	
☐ Vegetarian ☐ Kosher ☐ Other Current Pregnancy - Diet Rx	
Weight Change (lbs) ☐ Recent Pre-Preg ☐ Last Preg BREAST FEEDING ☐ Prior Pregnancy ☐ This Pregnancy-Weeks	
NUTRITION ☐ Vitamins-Type Amt ☐ Minerals-Type Amt Meals/day ☐ Laxative ☐ Antacid ☐ Other	
Pre-Conception < 20 wks > 20 wks TOBACCO (cigarettes/day)	
ALCOHOL-Type (oz/day) MARIJUANA (joints/week) COCAINE (route/frequency) NARCOTICS-Type (amt) METHADONE (dose/day)	
OTHER:	
WORK: (hrs/day/ wk) COMMUTE-Type (hrs/day)	
TRAVEL/LONG TRIPS:	
EXERCISE-Type (hrs/day/ wk) REST/SLEEP (hrs/day-hrs/night) COITUS (per week)	
HOUSEHOLD SIZE (=) Living with Help at Home Adults Rooms ☐ Father of Fetus ☐ None ☐ Family Children Flights ☐ Parents ☐ Other ☐ Domestic	
PUBLIC ASSISTANCE Case Worker ☐ WIC ☐ Food Stamps ☐ School Lunches ☐ ADC ☐ Medicaid ☐ Housing ☐ Other	
Signature-Date	

Date		LABORATORY RESULTS		Result
TYPE ☐ A ☐ B ☐ O ☐ AB		Protein ☐ Neg ☐ Pos		
Rh ☐ Neg ☐ Pos ☐ Du+		Sugar ☐ Neg ☐ Pos		
ANTIBODY ☐ Neg ☐ Pos		Nitrite ☐ Neg ☐ Pos		
SCREEN Anti Titer:		Esterase ☐ Neg ☐ Pos		
SEROLOGY ☐ Neg ☐ Pos		Abn Micro:		
FTA ☐ Neg ☐ Pos		P ☐ Neg ☐ Inflam ☐ Dysplasia		
RUBELLA Titer:		CIN: ☐ I ☐ II ☐ III		
☐ Immune ☐ Non-Immune		GC ☐ Neg ☐ Pos		
PPD ☐ Neg ☐ Pos		Chlamydia ☐ Neg ☐ Pos		
HB _s Ag ☐ Neg ☐ Pos		Urine ☐ Neg ☐ Pos		
Hct: Hgb:		Other: ☐ Neg ☐ Pos		
C WBC:		FATHER of the FETUS		
Diff ☐ Normal ☐ Abn				
Platelets ☐ Adeq ☐ Inadeq		TYPE ☐ A ☐ B ☐ O ☐ AB		
Hgb A,C		Rh ☐ Neg ☐ Pos ☐ Du+		
G-6-P-D ☐ Neg ☐ Pos		☐ Homozygous ☐ Heterozygous		
SICKLE PREP ☐ Neg ☐ Pos		Hgb ELECT:		
Hgb ELECT:		Hex A (Tay-Sachs) ☐ Neg ☐ Pos		
Hex A (Tay-Sachs) ☐ Neg ☐ Pos				

Date		Weeks	SCREENING TESTS		Result
			SERUM AFP (14-19 wks) ☐ Normal ☐ High ☐ Low		
			REPEAT AFP ☐ Normal ☐ High ☐ Low		
			DIABETES (early) ☐ Neg ☐ Pos		
			DIABETES (24-28 wks) ☐ Neg ☐ Pos		

Date		Weeks	GENETIC TESTS		Result
			C ☐ Chromosomes ☐ Normal ☐ Abn		
			V ☐ Other ☐ Normal ☐ Abn		
			A ☐ AFP ☐ Normal ☐ High ☐ Low		
			M ☐ Chromosomes ☐ Normal ☐ Abn		
			N ☐ Other ☐ Normal ☐ Abn		
			O		

Date		Weeks	SCREENING PROBLEMS		Result
201			BLOOD ☐ Rh Neg Not Sensitized		
202			GROUP Isoimmunization: ☐ Rh Sensitized ☐ Irregular Antibodies		
203			POS SEROLOGY ☐ FTA Pos ☐ False Pos ☐ Prior Rx-Date		
204			RUBELLA SUSCEPTIBLE (Non-Immune)		
205			HEPATITIS B ANTIGEN POSITIVE		
206			ANEMIA Mild (9-11 gms or 27-33%)		
207			Severe: ☐ Iron Deficient ☐ Hemolytic ☐ Other: ☐ Folate Deficient ☐ Hemoglobinopathy		
208			GU TESTS ☐ Abn PAP ☐ GC ☐ Chlamydia ☐ Asympt Bact ☐ Herpes		
209			POS PPD ☐ Recent Conversion ☐ BCG ☐ Abn Chest X-Ray		
210			POS GENETIC SCREEN ☐ AFP ☐ Sickle Cell ☐ Tay-Sachs ☐ Other		
211			POSITIVE DIABETES SCREEN		

Date		Weeks	ULTRASOUND		Result
			DATING PARAMETERS		
			BPD/GA Femur/GA Abdomen/GA Position		
			Placenta Location/Grade Amniotic Fluid Other Findings		

Date		Weeks	SERIAL TESTING and ADDITIONAL LAB		Result
			TEST: ☐ Neg ☐ Pos		
			TEST: ☐ Neg ☐ Pos		
			TEST: ☐ Neg ☐ Pos		
			TEST: ☐ Neg ☐ Pos		

Date		Weeks	EDUCATION and COUNSELING		Result
			Pregnancy Adaptation		
			Activities of Daily Life		
			Nutrition		
			Medications		
			Substances ☐ Tobacco ☐ Alcohol ☐ Drugs ☐ Other		
			Care Plan ☐ Screening Tests		
			Warning Signs		
			Preterm Labor Prevention		
			Labor Signs		
			Parenting ☐ Sibling Prep		
			Infant ☐ Care ☐ Feeding		
			Infant Car Safety		
			Family Planning		
			Special Topics		

Date		Weeks	REFERRALS		Result
			WIC		
			Nutrition		
			Dental		
			Social Service		
			Financial		
			Clin Nurse Spec		
			Medical/Surgical Consult:		
			Special Program(s)		
			Other:		
			Comments:		

APPENDIX M. Perceived Stress Scale (PSS)

PSS

ID# _____

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you dealt successfully with irritating life hassles?	0	1	2	3	4
5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?	0	1	2	3	4
6. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
7. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
8. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
9. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
10. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
11. In the last month, how often have you been angered because of things that happened that were outside of your control?	0	1	2	3	4
12. In the last month, how often have you found yourself thinking about things that you have to accomplish?	0	1	2	3	4
13. In the last month, how often have you been able to control the way you spend your time?	0	1	2	3	4
14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

VITA

Virginia Anne Kramer was born in Tucson, Arizona, on February 8, 1944. She attended local elementary schools and graduated from Salpointe Catholic High School. Over the next eighteen years, she attended several colleges and universities part-time. In 1978, she enrolled full time to complete her baccalaureate degree. Her Bachelor of Science in Nursing was awarded from the University of North Carolina at Chapel Hill in 1980.

Immediately after graduation, Ms. Kramer worked in the medical intensive care unit for several months and then transferred to labor and delivery. From that time forward, her nursing practice has been in Obstetrics and Gynecology. Since moving to Tennessee in 1981, she has been employed at the University of Tennessee Medical Center-Knoxville. She has worked as a staff nurse, office nurse, patient educator and registered sonographer. The focus of her practice for the past five years has been high-risk perinatal nursing.

In 1987, Ms. Kramer was accepted into the graduate program in the College of Nursing at the University of Tennessee-Knoxville. She received her Master of Science in Nursing degree with a major in Parent and Child Nursing, May 11, 1990.

The author is a member of Sigma Theta Tau, Nurses Association of the Academy of Obstetricians and Gynecologists, American Nurses Association, National and Tennessee Perinatal Association, American Institute of Ultrasound in Medicine, Society of Diagnostic Medical Sonographers, and serves on the March of Dimes Health Advisory Committee.