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# Relationship Between Number of Prenatal Visits and Infant Apgar Scores

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ABSTRACT

RELATIONSHIP BETWEEN NUMBER OF
PRENATAL VISITS AND INFANT APGAR SCORES

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This retrospective chart review examined the relationship between the number of prenatal visits and infant apgar scores and compared infant apgar scores among women who received inadequate, intermediate and adequate prenatal care according to Kessner's classification. Quota sampling was used to identify 30 individuals in each category of prenatal care.

The sample (N=90) consisted of women who delivered their babies at a hospital in a large Midwestern city. Neuman's Systems Model provided the framework for the study.

The findings indicate that there is a positive relationship between the number of prenatal visits and infant apgar scores ($r=.33, p=.002$) and that there are significant differences in infant apgar scores among women who received inadequate, intermediate and adequate prenatal care ($F=3.5, df=2,87, p=.035$).

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# Chapter 1

## INTRODUCTION

Every day throughout the world infants die after living only a short time. In 1992, 17,798 neonatal deaths were reported in the United States (U.S. Bureau of Census, 1997). Witwer (1990) reported that "worldwide, the United States ranks 17$^{th}$ in infant mortality (10.4 deaths per 1,000 live births)." The majority of these deaths reported were caused by congenital anomalies of the infant (U.S. Bureau of Census, 1997). Witwer (1990) also states that "nationally, 16 percent of all pregnant women (585,000 each year) receive inadequate prenatal care. Another 18 percent of pregnant women (661,000 each year) receive intermediate care." One of the goals of Healthy People 2000 (1992) is to "increase to at least 90 percent the proportion of all pregnant women who receive prenatal care in the first trimester." In this research, adequate is meant to measure the amount of prenatal care a person receives not the quality of that care.

One measure of infant status at birth and potential infant morbidity/mortality is the apgar score. The apgar is an assignment of points to five easily assessed signs as evaluated at 1 and 5 minutes after birth. A score of 0,1, or 2 is assigned for each of the five variables. A score of 10 indicates a newborn in the best possible condition. A

low score indicates a newborn with problems. An apgar score of 7 or higher indicates a newborn in good condition. It would be beneficial for healthcare providers to be able to predict the apgar scores of infants with apgars less than 7. Knowing ahead of time, which infants are at risk for low apgar scores, would aid the healthcare providers present at delivery in possible resuscitation needs of the infant.

One factor that is thought to influence the infant apgar score and potential infant mortality/morbidity is prenatal care. As stated earlier it has been reported that 34 percent of pregnant women each year receive less than adequate prenatal care. Healthcare providers need to target these women and assure they receive adequate care. This can be done by the providers stressing the importance to their clients of seeking prenatal care as soon as pregnancy is suspected and of making sure routine appointments are kept as the pregnancy progresses.

Providers are also challenged with increasing prenatal care for women who are not routine consumers of healthcare. York, Grant, Gibeau, Beecham and Kessler state "the women at risk for obtaining inadequate prenatal care are lower income women who are younger than 20, unmarried, multiparous, black, Hispanic, or first generation or those who have completed less than 12 years of education" (1996,p.281). The results of the study suggest that many women are at risk for obtaining inadequate prenatal care. This also suggests that education plays an important role in women obtaining

adequate prenatal care. Nurses have a major role in the education of clients and could use their resources to help individuals become educated about the importance of adequate prenatal care. York et al. (1996) go on to state that where a person lives affects the level of prenatal care a woman receives. "Women who reside in inner cities and isolated rural areas generally receive inadequate prenatal care" (1996, p.281). These rural areas may not be receiving adequate prenatal care due to a lack of providers of prenatal care in that area. The individuals that live in the inner city may not be receiving adequate care due to many more patients per practitioner and a decrease in financial support of clinics providing prenatal care. Practitioners need to assess accessibility of health care and initiate strategies that will make adequate care more available.

If healthcare providers can identify clients likely to receive inadequate prenatal care, then interventions can be implemented to insure that pregnant women receive adequate care. Once these interventions are implemented, there is the potential to improve apgar scores and reduce infant mortality and morbidity.

The purpose of this study is to look at the relationship between the number of prenatal visits and infant apgar scores and differences in infant apgar scores among women who receive inadequate, intermediate and adequate prenatal care. This study will build on a number

of previous studies that looked at the concept of adequate prenatal care and its relationship to infant outcome, in this study measured by infant apgar scores. This study is also being done to enhance the research base of the adequacy of prenatal care in relation to apgar scores to give healthcare providers some guidelines for where to target specific interventions to increase quality of prenatal care.

# Chapter 2

## LITERATURE AND CONCEPTUAL FRAMEWORK

### Conceptual Framework

Pregnancy is a natural event, but one which causes major biophysical changes. Appropriate monitoring is imperative to make certain the changes do not pose a threat to the mother or infant. Neuman's Systems Model was chosen for this study because it focuses on responses to stressors and maintenance of equilibrium.

"Although most women in the United States do receive adequate care throughout their pregnancies, many women who are younger than 20, poor, undereducated, black or Hispanic do not" (Witwer, 1990). Many reasons are given for why individuals do not receive prenatal care. Since many of the women are poor, they may have difficulty finding transportation to and from appointments. Some other reasons an individual may receive inadequate prenatal care could be due to a lack of insurance or an unwanted pregnancy. York, Williams, and Munro (1993) looked at the maternal factors that influence adequacy of prenatal care. The women in their study "identified 22 personal reasons and structural barriers for receiving inadequate prenatal care. The five most frequently cited reasons were small children at home, no medical assistance card, didn't know reason, sadness or ambivalence about the pregnancy, and just moved to the area".

Theory Application

Identification and definition of all relevant concepts

Betty Neuman's Systems model was chosen as the theoretical framework for this study. Her model is an open systems model to show how individuals deal with stressors and maintain equilibrium in health and well being as seen in figure 1.

*Neuman's Framework for Prenatal Care*

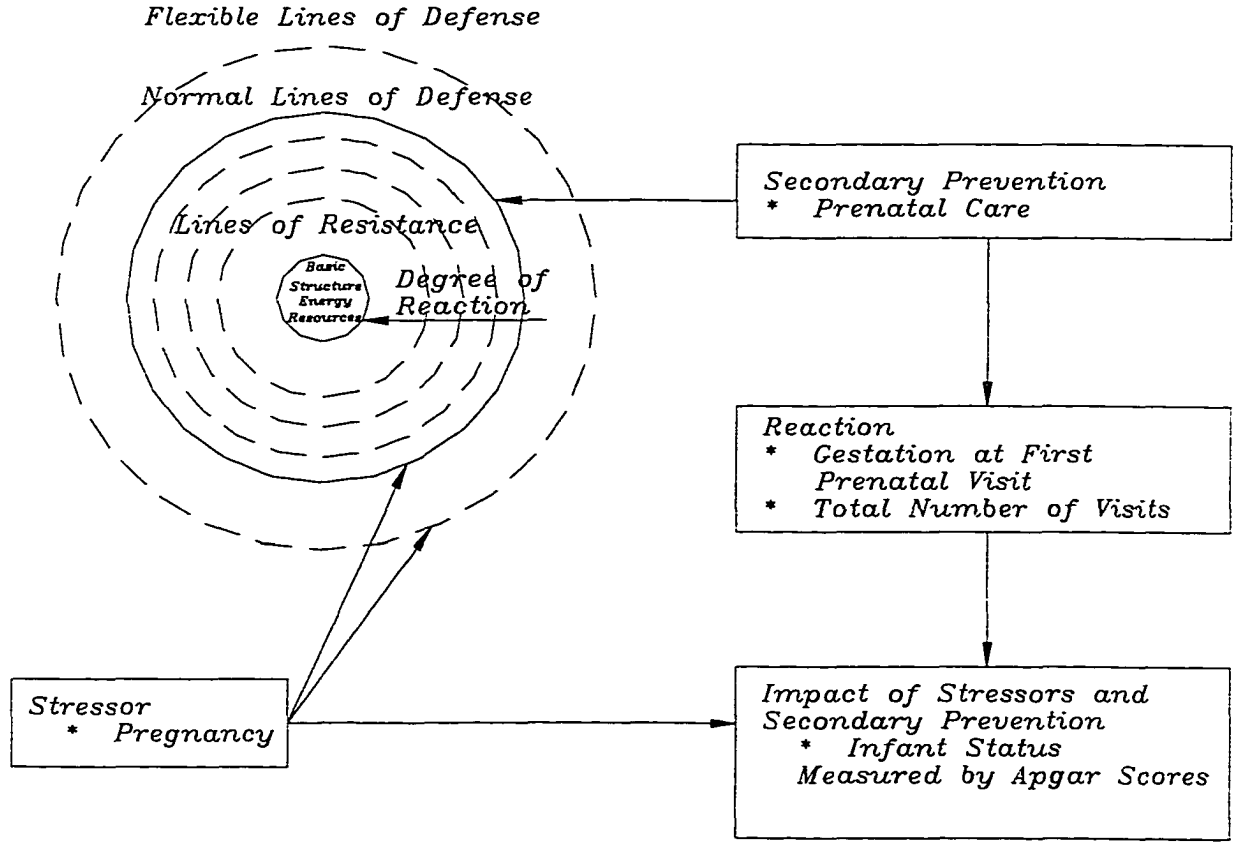

Figure 1. Neuman's systems model in relation to adequacy of prenatal care and apgar scores.

In Neuman's model clients are viewed as core structures surrounded by levels of core integrity and defense against stressors. These levels are labeled flexible lines of defense, normal lines of defense, and lines of resistance. The outer broken line represents the flexible lines of defense. These lines provide immediate protection from stressors.

The patient's normal lines of defense are represented by the solid lines encircling the individual. An individual's normal lines of defense are processes and attributes that have developed over time to maintain a state of dynamic equilibrium. The lines of resistance are depicted in the diagram by the broken lines encircling the basic structure energy resources. Neuman (1995, p.30) states that lines of resistance are "activated following invasion of the normal lines of defense by environmental stressors. These resistance lines contain certain known and unknown internal and external resource factors that support the client's basic structure and normal defense lines, thus, protecting system integrity."

Stressors are defined as "tension producing stimuli or forces occurring within both the internal and external environment boundaries of the client/client system" (Neuman, 1995, p.23). Neuman identifies three types of stressors: intrapersonal, interpersonal, and extrapersonal forces.

Neuman (as cited in Marriner-Tomey, 1994) also states that stressors are "stimuli which might penetrate both the client's flexible and normal lines of defense."

The stressor in this study is the pregnancy. When applying Neuman's theory to the situation of prenatal care, it seems reasonable to assume that each person has a normal line of defense, which maintains a dynamic equilibrium. Pregnancy breaks through the normal lines of defense by disrupting the client's equilibrium from emotional and physiological perspectives. Again by referring to figure 1 it is seen how the stressors are directed toward the client's normal lines of defense. In this case the client's line of resistance might be that the pregnant woman obtained her first prenatal visit, for whatever reason, in her second trimester. The patient's lines of resistance can be strengthened by appropriate interventions, such as the patient continuing to obtain the recommended number of prenatal visits. These actions that strengthen the lines of resistance are termed secondary prevention. Secondary prevention stems from how the individual will cope with the stressor and then goes toward the individual's normal line of defense.

An action indicative of secondary prevention would be seeking early prenatal care and obtaining care regularly during pregnancy. A measure of secondary prevention would be the woman's gestation at her first prenatal visit and the total number of visits she obtained throughout her

pregnancy. According to Neuman (1995, p.34) secondary prevention as intervention is used "to protect the basic structure by strengthening the internal lines of resistance." Neuman goes on to state that "treatment can begin at any point following the occurrence of symptoms."

Neuman's systems model provides a conceptual basis for this study. The concepts of the impact of the stressors and secondary prevention in relation to the infant are being observed. The outcome will be measured by the infant's apgar scores. The mother is the basic structure energy source. When she realizes she is pregnant this may disrupt her equilibrium. She may then choose to obtain prenatal care, which acts as a secondary line of defense.

Review of Literature

In general, a review of previous studies that looked at adequacy of prenatal care in relation to infant outcome consistently shows that the earlier and more frequent a woman obtains prenatal care, the better the outcome for the infant. Baldwin and Chen (1996) used a descriptive correlational study to look at the use of public health nursing services in relation to adequacy of prenatal care and infant outcomes. Their sample (N=1222) consisted of 505 public health nursing clients, 314 Women, Infants and Children (WIC) clients, and 403 clients receiving neither of these services. The study measured a multitude of modifying variables including maternal age, marital status, race, education level and prenatal status. Infant outcome was

measured by the infant's birthweight and gestational age. The study reported a significant relationship between the timing of the initial public health nurse visit and adequacy of prenatal care and gestational age. However, the study showed no relationship between the timing of the introduction of the public health services nor the number of visits the public health nurse made and infant birthweight. The findings also indicated that the more the public health nurse visited the patient prenatally, the greater the positive "effect on birthweight and gestational age" (Baldwin & Chen, 1996). The findings also reiterate the suggestions that early prenatal care can have positive effects on certain aspects of infant outcome.

Another study by Olds, Henderson, Tatelbaum, and Chamberlain (1986) looked at nurse home visitation and pregnancy outcomes. In their study teenagers, primiparous and unmarried and low socioeconomic status women were targeted. The researchers used a randomized clinical trial (N=400). The researchers divided the women into two groups. One group received no excess interventions, while the other group received home nurse visitation. The findings of this study were that comprehensive prenatal services (including home visitation) among this sample population had positive effects on birth weight and length of gestation. The researchers also found that mothers had greater dietary improvements and fewer kidney infections and fathers became more involved with the pregnancy in the experimental group.

Kessner, Singer, Kalk, and Schlesinger (1973) conducted a retrospective correlational study looking at the adequacy of prenatal care and infant outcomes. In their study, two infant outcomes were looked at: birthweight and infant death. The study consisted of all live births (N=140,000) in New York City in 1968. In examining all the births for the year, the researchers looked at maternal variables including age, race, education level, prenatal status, and health risks. Their intent was to classify women according to the risk of fetal demise and to assess the effect that health services may have had on ameliorating that risk. One of the findings of this study is that generally, adequacy of prenatal care is strongly and consistently associated with birthweight and infant survival. Another finding is that there is consistent association between social class, as measured by educational attainment of the mothers, and birthweight and infant survival. After analyzing their results, Kessner et al. (1973) made the following recommendation: "All pregnant women should be evaluated in the first trimester and classified by risks that could adversely affect the survival of their infants."

Rotherberg and Lits (1991) used an experimental design study to research psychosocial support for maternal stress during pregnancy and its effect on birth weight. The sample included white mothers with single pregnancies and no known medical risk factors for low birth weight. They divided the

women into two groups. One group received standard antenatal care, while the other group was enrolled in a psychosocial support group at 20 weeks gestation. Results from this study were that the infants from the supported group weighed less than 3000 gm at birth versus the infants in the control group. Rotherberg and Lits (1991) reported that "this effect was more the result of improved intrauterine growth than of prolongation of pregnancy." They then concluded that psychosocial support has a significant effect on birth weight.

Geronimus (1986) researched the relationship of race, residence, and prenatal care to birthweight, gestational age, and neonatal mortality. Geronimus (1986) used data about infant mortality rates from 1976-79 (N=305,907). She found that at every maternal age observed, blacks experienced higher neonatal mortality rates (NMR's) compared to whites. She found that lack of prenatal care was significantly related to infant mortality rates. "During pregnancy, lack of prenatal care, including high-risk screening, prescription of appropriate therapies for identified problems, and referral to tertiary centers for birth as needed are further ways that social disadvantage can promote higher risks of neonatal morbidity and mortality" (Geronimus, 1986).

Reis, Mills-Thomas, Robinson, and Anderson (1992) conducted a qualitative study of an inner-city community's perspective on infant mortality and prenatal care. Reis et

al. (1992) used a convenience sample (N=380) to answer questions on their perspectives of infant mortality and prenatal care. They reported that only 50 percent of the 380 could correctly define infant mortality. Their results showed that the majority of individuals polled believed that prenatal care is important and should start in the first trimester. The majority of respondents were unsure of how many visits a pregnant woman needs to obtain during her pregnancy. Other results listed perceived barriers to prenatal care, which included financial, institutional, and attitudinal barriers. Reis et al. (1992) reported the biggest barrier listed by pregnant women for obtaining prenatal care was the fear of detection of drug use.

Omar and Schiffman (1995) researched pregnant women's perceptions of prenatal care. A focused group technique using a semi-structured interview format was the method used for this study (N=22). The individuals were divided into three groups in the third trimester of pregnancy. Questions were asked about their satisfaction with health care providers, support staff and prenatal care. Satisfaction with prenatal care included the desire to continue care with their provider, clear explanations and accessible, quality care. Omar and Schiffman reported that "the provider relationship was identified as having the greatest influence on the women's satisfaction with prenatal care." Omar and Schiffman even suggest "Satisfaction with prenatal care can be enhanced through positive provider-patient interactions."

York, Williams, and Munro (1993) asked 57 pregnant women who had received inadequate prenatal care to identify the factors that influenced their decisions related to prenatal care. Data for this study were collected in a clinic that offers free prenatal care and can be reached by public transportation. The women were interviewed and the results of the study identified 22 personal reasons or barriers explaining why the women did not receive adequate prenatal care. As stated earlier, York et al. (1993) reported "the five most frequently cited reasons were small children at home, no medical assistance card, didn't know reason, sadness or ambivalence about the pregnancy, and just moved to the area."

Lee and Grubbs (1995) studied 49 pregnant teenagers using an exploratory descriptive design to look at the teenagers' reasons for seeking prenatal care and perceived barriers for not receiving adequate prenatal care. The main four reasons listed for why the teenagers sought care were "they felt sick, their mother told them to go, they wanted a pregnancy test, and they wanted to take care of themselves." Barriers reported by the teenagers in this study included difficulty finding a physician that would accept Medicaid reimbursement, did not like the long wait at the local health department, were afraid to tell their mothers they were pregnant, did not recognize they were pregnant until the fourth of fifth month of gestation, did not have the money to pay for prenatal care or that they were trying to

hide their pregnancy. One teenager reported as a barrier that she was afraid her mother would force her to have an abortion.

Other limitations from the literature review came from the samples. Kessner et al. (1973) used a sample from New York City. This sample does not represent the population of the United States or any international populations. Reis et al. (1992) limited their sample to inner city. Other limitations from the samples of the literature come from Lee and Grubs (1995), Geronimus (1986) and Olds et al. (1986) they all had samples consisting of teenagers. Certainly not only teenagers obtain prenatal care. The small sample size of some of the literature was also a limitation. Omar and Schiffman (1995) had a sample of 22 women. York et al. used 57 subjects in their study. These are compared to the samples of some of the other literature: Geronimus (1986) had a sample of 305,907 and Kessner et al. (1973) had a sample of 140,000.

Summary of Literature

In summary, the literature has supported the findings that adequate prenatal care, care beginning in the first trimester and continuation of that care until delivery, leads to better infant outcomes (Baldwin, & Chen, 1996; Geronimus, 1986; Kessner, Singer, Kalk, & Schlesinger, 1973; Olds, Henderson, Tatelbaum, & Chamberlain, 1986; Rothberg & Lits, 1991). These studies looked at extraneous variables such as maternal age, race, and education level. Some of

these studies also looked at various kinds of psychosocial support and home nursing care prenatally and its effect on infant outcome (Baldwin, ShuPi, & Chen, 1996; Rothberg & Lits, 1991). In these studies infant outcomes were commonly measured by birthweight, gestational age, and infant mortality/morbidity. The literature also supports the findings that inadequate prenatal care is related to a higher incidence of infant death (Geronimus, 1986; Kessner, Singer, Kalk, & Schlesinger, 1973).

Some of the literature looked at reasons individuals listed for receiving inadequate prenatal care (Lee & Grubbs, 1995; Munro, Williams, & York, 1993). While other studies looked at perceptions individuals had of prenatal care (Omar & Schiffman, 1995; Reis, Mills-Thomas, Robinson & Anderson, 1992).

## Definitions

### Adequacy of care/visits.

In discussing adequacy of prenatal care visits as a quality indicator, the definition is of paramount importance. The Kessner Adequacy of Prenatal Care Index (Kessner,1973) determines the adequacy of prenatal care by looking at the "month prenatal care begins and the number of visits a women receives prior to delivering. There are then three levels of adequacy (Adequate, Intermediate, and Inadequate)" (Kotelchuck, 1994). To receive adequate prenatal care, a woman would have to obtain her first prenatal visit within the first trimester of pregnancy. She

would then have to have 9 or more prenatal visits to her provider. Her decision to obtain prenatal care, at what gestation, and the total number of visits she obtains will determine her level of prenatal care. Early and frequent prenatal care will be construed as adequate prenatal care. The adequacy of prenatal care potentially will have an impact on the infant. The efficacy of secondary prevention in maintaining the core integrity and thus the quality of the internal environment in which the fetus develops can be measured indirectly by the infant's apgar scores.

Kotelchuck (1994) evaluated the Kessner Prenatal Care Index (1973). He compared the index to his own development of the Adequacy of Prenatal Care Utilization Index (Kotelchuck, 1994). Kotelchuck (1994) states four negative features of Kessner's Index. Kotelchuck (1994) states the first flaw of the Kessner Index is the fact that the Kessner Index weighs so much on the initiation of prenatal care. Second, the Kessner Index does not differentiate inadequate care related to late initiation of care or insufficient number of visits. Third, Kotelchuck (1994) feels that the Kessner Index does not give a rationale for stopping at nine visits as criteria for adequate prenatal care. Last, Kotelchuck (1994) feels there is a lack of early documentation of the Kessner Index which he feels has led to nonstandardized definitions and discrepancies in placing women into the levels of prenatal care. Regardless of these criticisms, the Kessner Index was chosen for this study.

Using Kotelchuck's Index to classify women into levels of prenatal care was not chosen because it only offered two levels of prenatal care, either adequate or inadequate. This left out the intermediate category that Kessner's Index allowed for. Kotelchuck's Index (1994) is then overclassifying subjects as well as underclassifying them into two levels of prenatal care. The Kessner Index was used so subjects were not wrongfully classified into the inappropriate levels of care.

Some limitations were found while reviewing the literature. Baldwin and Chen (1996), Chen et al. (1995) and Omar and Schiffman (1995) were the only literature that used a conceptual framework with their studies. Baldwin and Chen (1996) formed a framework to help conceptualize the use of prenatal public health nursing services and infant outcomes. Chen et al. (1995) derived their conceptual framework from "using the categories of principal risk factors for low birthweight as a guide.(p.47)" Omar and Schiffman (1995) used King's nursing conceptual framework to guide their study of pregnant women's perceptions of prenatal care.

Research Questions

What is the relationship between number of prenatal visits and infant apgar scores?

What differences are there in infant apgar scores among women who receive inadequate, intermediate and adequate prenatal care?

# Chapter 3

## METHODS

Previous studies have indicated that the earlier in pregnancy a woman obtains her first prenatal visit and the more often she goes in for other prenatal care, the better outcome her infant will have. The purpose of this study was to look at the relationship between number of prenatal visits and infant apgar scores and differences in infant apgar scores among women who receive inadequate, intermediate and adequate prenatal care.

### Design

Question number one used an Ex Post Facto (Correlational) research design. This type of design shows a relationship between two variables that occurs naturally, without an intervention from the researcher. Question number two used an ANOVA with a Scheffe test. A retrospective chart review was done of patients that delivered their babies at a local hospital. Since adequacy of care is determined on the basis of quantity of care, no attempt was made to evaluate variations in quality of care. At the time of the birth, the labor and delivery or the newborn nursery nurses assigned the apgar scores of the infant as part of standardized infant care.

Sample

Records for this research study came from patients who received prenatal care from a local health clinic and delivered their babies at a local hospital in a large Midwestern city. This hospital delivered 1186 babies from this clinic in 1997. Since this study was focusing on the relationship between prenatal care and apgar scores, variables needed to be eliminated that could have an effect on the infant's apgar scores. Criteria for elimination of individuals in this study was any pre-pregnancy conditions or diseases that the woman may have that could have an effect on the infants apgar score and any infant born at less than 37 weeks gestation. Other variables such as pregnancy induced hypertension (PIH), gestational diabetes, oligohydramnios, and polyhydramnios are all variables that were considered as possibly existing due to inadequate prenatal care. This criteria was decided upon to give a more homogenous sample for the study. Kessner, Singer, Kalk and Schlesinger (1973) point out that "more than 95% of the women with risks can be identified during an initial evaluation." This supports the idea that at-risk women with a lack of prenatal care may incur some of these pregnancy-related problems throughout the pregnancy.

Quota sampling was used to obtain approximately 30

individuals with inadequate, 30 individuals with intermediate and 30 individuals with adequate prenatal care. The total number of subjects in this study was 90. A list of all clinic patients that delivered in 1997 was obtained. From that list every 5th name that met the previously identified criteria was used in the study.

## Instruments

### Kessner index.

Adequacy of prenatal care was be measured by using Kessner's Adequacy of Prenatal Care Index (Kessner et al., 1973). The Kessner index classifies prenatal care as adequate, intermediate or inadequate based on consideration of these variables: gestation at the time of the first prenatal visit, number of total visits and whether the baby was born in the hospital or private service (See Appendix A). All of the individuals in this study had delivered in a hospital. According to Kessner et al. (1973), the three categories of adequacy "imply qualitative differences." As earlier stated Kessner believes that most women with risks can be identified at an early prenatal visit. That is why one of his key concepts in measuring prenatal care is the gestation at which prenatal care starts. Adequate prenatal care refers to a woman initiating prenatal care within her first trimester and obtaining at least nine other prenatal visits during her pregnancy. Intermediate prenatal care refers to initiation of prenatal care within the second

trimester of pregnancy and obtaining four to nine additional prenatal visits. Inadequate prenatal care refers to initiation of prenatal care within the third trimester and obtaining four or less additional prenatal visits, or no prenatal care at all.

The Kessner index was developed in 1973 as a tool to measure prenatal care and infant mortality in the state of New York. Since that time, other studies have used the Kessner index to evaluate prenatal care (Schramm, 1992; Chen et al.,1995).

Apgar score.

Another instrument that was used is the apgar score. Apgar (1974) states the apgar score is "a way to judge the condition of the newborn quickly and accurately shortly after birth." A number is assigned to an infant at one minute and five minutes after birth. This number can be from 0-10 depending on the infant's well being. Two points are the maximum that can be allotted for each of five categories: heart rate, respiratory effort, muscle tone, reflex irritability and color (See Appendix B). These five categories are universally accepted as the variables most appropriate to assess. The criteria for assigning points is quite objective. The objectivity of assignment of points enhances inter-rater reliability. Either the infant has a heart rate <100, >100 or none at all. All five categories of the apgar score are similar in objectivity. Limitations from the apgar score stem from a subjective approach to the

score. For example, color of the infant could be somewhat subjective. Limitations could also be set by the scorer. Were apgars done at exactly one and five minutes? The apgar score is used world wide in helping to determine appropriate resuscitation needs of an infant in poor condition. This consistent reuse of the apgar score gives the tool criterion-related validity. The apgar test is very reliable as seen in its daily use of assigning scores. Apgars are a required component on birth records. All physicians and nurses assisting in births are neonatal advanced life support certified, allowing them to reliably score infants.

Procedure

As earlier stated, the data obtained for this study came from a retrospective chart review that was conducted to asses adequacy of prenatal care and obtain infant apgar scores. The names of clinic patients who delivered in 1997 were obtained from a delivery log. The delivery logbook included every birth at the hospital for the year of 1997. The logbook included the patient's name, date of delivery, pregnancy-related complications and physician were information that was included in the logbook. Every 5$^{th}$ patient that met the previously identified criteria was used until the quota of 30 individuals in each level of prenatal care is obtained. Medical records personnel then pulled the charts and data were collected on the appropriate form (Appendix C).

Human Subjects

Only the subject's charts were used and the subjects were not contacted by the researcher. A form was designed to collect data on (Appendix C). No intervention occurred for this research project. Since there was no intervention or contact with the subjects, no consent form was needed. Approval from the hospital was needed to use their clients as subjects. A meeting was set between the researcher and the Institutional Review board of the hospital to present the proposal and ask permission to obtain data from medical records. An application was also submitted to the Human Research Review Committee through Grand Valley State University (GVSU) for permission to go further in the research process. Permission was obtained from both committees (see Appendix D and E).

# Chapter 4

## RESULTS/DATA ANALYSIS

The purpose of this study was to look at the relationship between number of prenatal visits and infant apgar scores. Another focus of the study was to look at differences in infant apgar scores among women who receive inadequate, intermediate and adequate number of prenatal care visits. Descriptive statistics were used to analyze demographic variables. Analysis of the data for question one occurred by using a Pearson r correlation. A one way analysis of variance was used to answer question two.

### Description of the Sample

A systematic quota sampling procedure was used to obtain 30 cases from each level of prenatal care-Adequate, intermediate and inadequate. Subjects were taken from a list of deliveries from a local hospital. Starting with the first delivery of 1997, every $5^{th}$ name that met the set criteria was used in the study until the quotas were reached. A total of 90 cases were identified. Data was then obtained from the medical records. Age, Race, levels of prenatal care, one and five minute apgar scores, total number of prenatal visits, weeks gestation at first prenatal visit, cesarean section, vaginal delivery and live births were all noted.

The age of the individuals in the sample ranged from 16-29 years (M=21 yrs,SD=1.4). The majority (58%) of subjects

were Caucasian. Other races included African Americans (34%), Hispanics (7%) and Asians (2%).

All births were live births. The majority (77%) of the subjects had vaginal deliveries. Only 23% had cesarean deliveries. The number of weeks gestation at first prenatal visit ranged from 5-37 (M=16.5,SD=9.54) with three individuals receiving no prenatal care. The total number of prenatal visits ranged from 0-16 (M=10.8,SD=4.19). The one minutes apgar scores ranged from 5-9 (M=7.8,SD=.90). The five minute apgar scores ranged from 7-10 (M=9.1,SD=.66). Nine of the subjects in the study had pregnancy-related complications. Two individuals had pregnancy-induced hypertension. One individual had gestational diabetes. Four individuals had oligohydramnios. Two individuals had polyhydramnios.

Research Questions

Research question number one asked, what is the relationship between number of prenatal visits and infant apgar scores? Using a Pearson r correlation, a positive relationship (r=.33,df=88,p=.002) between the number of prenatal visits and one minute apgar scores was found. A moderate positive relationship (r=.43,df=88,p=.000) between the number of prenatal visits and five minute apgar scores was found. This suggests that the greater the number of prenatal visits, the higher the infant apgar scores are likely to be.

Research question number two asked, are there

differences in infant apgar scores among women who receive inadequate, intermediate and adequate prenatal care? A one way analysis of variance was used to answer question number two. The one minute apgar scores of the infants whose mothers received adequate prenatal care ranged from 7-9 (M=8.1). The five minute apgars ranged from 9-10 (M=9.3). The one minute apgars of the infants whose mothers received intermediate prenatal care ranged from 6-9 (M=7.8). The five minute apgars of these infants ranged from 8-10 (M=9.2). The one minute apgars of the infants whose mothers received inadequate prenatal care ranged from 5-9 (M=7.5). The five minute apgars of these infants (see Table 1) ranged from 7-10 (M=8.7).

Table 1

Levels of Prenatal Care and Infant Apgar Scores

| | Adequate | | Intermediate | | Inadequate | |
|---|---|---|---|---|---|---|
| Apgar Scores | | | | | | |
| | M | SD | M | SD | M | SD |
| 1 minute | 8.1 | .68 | 7.8 | .99 | 7.5 | .94 |
| 5 minute | 9.3 | .48 | 9.2 | .59 | 8.7 | .74 |

Differences were found in the mean one minute apgar scores among women who received prenatal care ($F=3.5, df=2,87, p=.035$). Differences in the mean five minute apgar scores were also found ($F=7.66, df=2,87, p=.0009$). A scheffe test was then performed on both the one and five

minute apgar score means to locate the differences within the three categories of prenatal care. Using the mean one-minute apgar scores, those individuals who were in the adequate prenatal care group were found to have significantly higher apgar scores than the other two groups. A scheffe test was then performed on the means of the five-minute apgar scores. Those individuals that were in the adequate and intermediate groups were found to have significantly higher apgar scores than the inadequate group. Clearly women who received adequate prenatal care had higher one (M=8.1) and five minute (M=9.3) apgar scores, than women who received inadequate prenatal care. Women who had intermediate care were similar to those with inadequate care at one minute and similar to women receiving adequate care at five minutes.

Table 2

Differences in Apgar Scores With Different Levels of Prenatal Care

| | Adequate | Intermediate | Inadequate |
|---|---|---|---|
| Apgar Scores | | | |
| | M | M | M |
| 1 Minute | 8.1* | 7.8 | 7.5 |
| 5 Minute | 9.3* | 9.2* | 8.7 |

(*) Indicates significant differences of the means using a Scheffe test.

Summary

The study sample consisted of a total of 90 individuals. Each category of prenatal care included of 30 individuals. A positive relationship was found between the number of prenatal visits and the infant apgar scores. Differences in infant apgar scores among women in the three levels of prenatal care were also found ($F=3.50, df=2,87, p=.035$). Those women who received adequate care had significantly higher infant apgar scores at one and five minutes than women who had received inadequate care.

# Chapter 5

# DISCUSSION AND IMPLICATIONS

This chapter contains interpretations of findings of Chapter 4. Findings, recommendations for further research, limitations of the study and application to practice are discussed. The purpose of this study was to look at the relationship between number of prenatal visits and infant apgar scores and differences in infant apgar scores among women who receive inadequate, intermediate and adequate prenatal care. The researcher used Betty Neuman's systems model for a conceptual framework to assist in reviewing the data.

## Discussion of Findings

Neuman's Systems Model. Neuman's Systems Model was chosen for this theoretical framework. Her model shows how individuals deal with stressors and maintain equilibrium in health and well being (see figure 1). In this study pregnancy was seen as a stressor. As stated earlier Neuman defines stressors as "tension producing stimuli or forces occurring within both the internal and external environment boundaries of the client/client system" (Neuman, 1995, p.23). Neuman also states "the potential outcome of an interaction with a stressor may be beneficial (positive) or noxious (negative)." Pregnancy is viewed as interrupting the normal lines of defense with the potential for threatening the lines of resistance if some degree of

equilibrium is not restored. Prenatal care is a key factor in that restoration.

This study found a positive relationship between the number of prenatal visits and infant apgar scores. The more prenatal visits the higher the infant apgar scores were. The women who obtained early, continuous prenatal care had earlier gestation at the first visit and more prenatal visits which were positively related to the infant apgar scores. Women who did not obtain prenatal care or who were late to seek care had less total number of prenatal visits and lower apgar scores. Secondary prevention in the form of prenatal care has an affect on the individual's lines of resistance. The variation in secondary prevention (when and how often the woman obtains prenatal care) appears to have an impact on infant status, as measured by apgar scores. The results of this study show secondary prevention being strengthened by women who received adequate care. The propositions of Neuman's model are supported by the findings that those women with more adequate intervention (adequate and intermediate care) have more positive infant outcomes.

Prenatal visits/Apgar scores In reviewing the data the researcher found that there was a positive relationship between the number of prenatal visits and infant apgar scores. The literature supports this. Baldwin and Chen (1996), Olds et al. (1986) and Rotherberg and Lits (1991) all conducted research on the effect nursing interventions, such as home health visits, on infant outcomes. Each study

found that the earlier and more consistent the home visits were, the better the infant outcome was.

Differences. The levels of prenatal care, adequate, intermediate and inadequate were measured by quantity of prenatal visits not quality. Significant differences in apgar scores of women who received various levels of prenatal care were found. The data indicated that those individuals with adequate prenatal care had higher one minute mean apgar scores than those individuals with intermediate or inadequate prenatal care. Those individuals with adequate and intermediate prenatal care had higher five-minute mean apgar scores than those termed with inadequate prenatal care. The literature supports findings such as these. Kessner et al. (1973) developed the method used to classify women into levels of prenatal care. Although they looked at infant outcome, but not particularly at infant apgar scores, their research suggests that the individuals with adequate prenatal care have much better infant outcomes than those individuals with intermediate or inadequate prenatal care.

Limitations

The study was limited by the use of a single institution and a sample that received prenatal care from a single practice. The results of the study, therefore, can only be compared to a similar study. Further investigation of the effect inadequate prenatal care has on infant apgar scores needs to be conducted with larger and more diverse

samples to substantiate the results. Exploring diverse populations in different settings is also suggested.

The study could also be limited by the individual giving an apgar score. Variations could exist if the scores are not done at exactly one and five minutes. Although the apgar is a fairly objective measure, limitations could come in assessing the color of the infant. As discussed earlier color is the only category of the apgar score that could be somewhat subjective. Lack of control of measurement of some prior health factors may be another limitation.

Suggestions for Research

Further studies are required to assess what other infant complications can be related to inadequate prenatal care. Again, being able to predict the infants that may have low apgar scores would allow the delivery team to be prepared thus saving time.

Lee and Grubs (1995) and York et al. (1993) conducted studies looking at factors that influenced individuals to receive inadequate prenatal care. More studies like this need to be in place. Reasons why women seek prenatal care late or miss numerous appointments need to be identified. With this information these women could be targeted before they even become pregnant, hopefully preventing individuals from being late to seek care.

York et al. (1993) and Lee and Grubs (1995) did studies that looked at barriers to prenatal care. More studies need to be done on patient perceptions or reasons to receiving

inadequate prenatal care. These barriers then need to be addressed by the nurse at the first prenatal visit. For example, if transportation is the only thing preventing the patient from coming to prenatal visits, a social worker could be brought in to identify resources in the community that may provide transportation services.

Further studies also need to be done to see if there is a relationship between those individuals that seek prenatal care after 12 weeks gestation and numerous missed appointments. Individuals who are late to seek care need to be educated intensively on the importance of prenatal visits. They need to be informed of the possible consequences of being late to seek care and missed prenatal visits. However, this sometimes is not enough. Studies need to be done to address what motivates women to receive adequate prenatal care. Once these barriers and motivators are identified, programs can be set in place to overcome them.

Application to practice

According to this research it is imperative that health care providers inform patients of the need for early and continuous prenatal care. This dialog needs to start with women who are in the office for preconception counseling or infertility or any women who may be considering pregnancy. Throughout the pregnancy, any missed visits need to be thoroughly discussed with the patient. The reasons for missed appointments then need to be addressed by the nurse.

The nurse can work with patients to strengthen the women's flexible lines of defense to combat stressors that may be causing the missed appointments.

An interdisciplinary team approach would be an advantage in assisting the women to continue with regular prenatal care. As mentioned earlier, if lack of transportation is a reason women are missing prenatal visits a social worker could be contacted to help identify community resources for transportation of the women to their prenatal appointment. If no insurance is the reason the woman is not receiving adequate prenatal care, federal, state and community resources need to be identified to assist the patient with the cost of prenatal care. When appointments are missed, the office staff needs to try to reach the patient either by phone or mail to reschedule the appointment and try to prevent any more missed appointments. Protocols need to be in place so that every office throughout the nation is trying to assist the women.

The importance of early and continuous prenatal care needs to be reiterated. Goal setting between the nurse and patient may need to be done. Perhaps the patient needs a motivator to come to all of the appointments. A program could be set up for women who attend all prenatal visits to then receive a free gift.

Identification of women who received inadequate prenatal care and who are at risk for low infant apgar scores would allow for the delivery team to be ready for an

infant that may need more than the usual resuscitation following delivery. Having an early identification process of women at risk could save time. Protocols could be in place to require a Neonatal Nurse Practitioner (NNP) at all deliveries of women at risk.

Summary

The results of this study suggest that there is a positive relationship between the number of prenatal visits and infant apgar scores. The research also suggests that there are differences in infant apgar scores of women who receive different levels of prenatal care. Interventions to assist the woman to obtain all the necessary prenatal visits to allow her infant the best possible outcome need to be in place. Education of the woman about the risks and complications associated with inadequate prenatal care needs to be a standard. Being able to anticipate the infants who may have low apgar scores would allow the delivery team to be prepared. The use of NNP's could be a standard at the delivery of infants with anticipated low infant apgar scores.

# APPENDICES

# Appendix A

## The Kessner Adequacy of Prenatal Care Index

| Medical Care Index | Gestation (Weeks) | | Number of Prenatal Visits |
|---|---|---|---|
| Adequate[a] | 13 or less | and | 1 or more or not stated |
| | 14–17 | and | 2 or more |
| | 18–21 | and | 3 or more |
| | 22–25 | and | 4 or more |
| | 26–29 | and | 5 or more |
| | 30–31 | and | 6 or more |
| | 32–33 | and | 7 or more |
| | 34–35 | and | 8 or more |
| | 36 or more | and | 9 or more |
| Inadequate[b] | 14–21[c] | and | 0 or not stated |
| | 22–29 | and | 1 or less or not stated |
| | 30–31 | and | 2 or less or not stated |
| | 32–33 | and | 3 or less or not stated |
| | 34 or more | and | 4 or less or not stated |
| Intermediate | All combinations other than specified above | | |

[a] In addition to the specific number of visits indicated for adequate care, the interval to the first prenatal visit had to be 13 weeks or less (first trimester), and the delivery must have taken place on a private obstetrical service.

[b] In addition to the specific number of visits indicated for inadequate care, all women who started their prenatal care during the third trimester (28 weeks or later) were considered inadequate.

[c] For this gestation group, care was considered inadequate if the time of the first visit was not stated.

# Appendix B

## The Apgar Scoring System

| | Score | | |
|---|---|---|---|
| *Component* | *0* | *1* | *2* |
| Heart rate | Absent | <100 beats/min | >100 beats/min |
| Respiratory effort | Absent | Weak cry; irregular | Good |
| Muscle tone | Limp | Some flexion of extremities | Well-flexed |
| Reflex irritability | No response | Some motion | Cough or sneeze |
| Color | Blue, pale | Body pink, extremities blue | Completely pink |

Appendix C

Assigned #_____

Age_____

Race_____

Live birth_____

Type of delivery_____

Weeks gestation at first prenatal visit_____

Total number of prenatal visits_____

Apgars: 1 minute_____ 5 minute_____

Prenatal problems:

PIH_____

Gestational Diabetes_____

Oligohydramnios_____

Polyhydramnios_____

Appendix D

Metropolitan Hospital
1919 Boston, S.E.
P.O. Box 158
Grand Rapids, Michigan 49501-0158
(616) 247-7200

August 14, 1998

Sara Pernie, R.N.
4239 Ambrose N.E.
Grand Rapids, MI 49505

Dear Ms. Pernie:

Your research project entitled "Adequacy of Prenatal Care and Infant Apgar Scores" was reviewed and approved at the July 23, 1998, meeting of the Metropolitan Hospital Institutional Review Board. There was discussion that the term "Adequacy" refers to the number of prenatal visits a woman receives and does not reflect the quality of the prenatal care the woman receives. Therefore, the Institutional Review Board recommends that you change the title of your study to reflect the above discussion.

Therefore, please send a letter to my office indicating that you indeed have changed the title of your study. In addition, when your research is complete, please notify my office so that you can be scheduled to return to the Institutional Review Board and report your findings.

Please feel free to contact me at 247-7288 with any questions.

Sincerely,

[redacted]

William C. Cunningham, D.O., M.H.A.
Senior Vice President and Chief Medical Officer

GRAND VALLEY
STATE UNIVERSITY

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February 18, 1999

Sarah Pernie
4239 Ambrose NE
Grand Rapids, MI 49505

Dear Sarah:

Your proposed project entitled "***Relationship Between Number of Prenatal Visits and Infant Apgar Scores***" has been reviewed. It has been approved as a study which is exempt from the regulations by section 46.101 of the Federal Register 46(16):8336, January 26, 1981.

Sincerely,

[redacted]

Paul Huizenga, Chair
Human Research Review Committee

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