THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF PSYCHOLOGY

PRENATAL EMERGENCY MEDICAL VISITATION AS PREDICTED BY TOTAL PRENATAL VISITATION, GESTATIONAL AGE, AND MATERNAL AGE

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ABSTRACT

This is a retrospective study using prenatal medical records to examine expectant mothers' emergency medical visitation (N = 70). Emergency visitation was defined as either directly seeking treatment at an emergency department or hospitalization under 24 hours. Total prenatal medical visitation, timing of prenatal care, and maternal age at delivery were examined as potential predictors. We predicted that emergency department (ED) visitation would be inversely related with total prenatal visitation and maternal age but would be positively correlated with the timing of the first prenatal visit. We found that total visitation, timing, and maternal age were not correlated with prenatal emergency visitation. These findings help to provide insight into how women with an unplanned pregnancy obtain medical care. This vulnerable population shows a higher frequency of medical visitation yet has been understudied.

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ACKNOWLEDGEMENTS

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Chapter 1: Introduction

In the American medical system, emergency departments (ED), urgent cares, and similar organizations play a crucial role in providing emergent and convenient care to supplement the regular system of primary care and specialists. Unfortunately, the convenience with which these institutions provide care leads to misuse and abuse. Studies have shown that ED overcrowding has been a major issue for over four decades. Additionally, there appears to be no slowing down as ED visits across the country, specifically for low-acuity concerns, have continued to increase annually (Zamora, 2019).

There have been many reasons proposed and studied as to why inappropriate ED use continues to increase. From such studies, two competing explanations have arisen: convenience, and lack of education. The convenience hypothesis argues that a major cause of ED abuse is from patients who prefer to use the ED as their primary medical resource (Kwack et al., 2004). This may be because of no need for appointments, no patient can be turned away, and access to many resources and services at once. In a study that compared ED visitation by patients during periods when they were both insured and uninsured, no significant difference was found. This was an unexpected finding as it has been suggested that the uninsured would be the main driving force of this hypothesis (Kwack et al., 2004). Meanwhile, the education theory posits that rather than intentionally misuing ED resources, patients unknowingly exaggerate symptoms and believe that their symptoms are greater than they are. This hypothesis has found more research support and has been found to be a predictor of ED visitation (Oberlander, Pless, & Dougherty, 1993). In a study that compared a patient's chief complaint upon arrival with their final diagnosis at discharge, of the patients who were diagnosed with non-emergent conditions, the majority had initially believed on arrival that their condition was emergent (Raven, Lowe,

Maselli, & Hsia, 2013). This finding suggests that patients misdiagnosing and genuinely exaggerating their condition is a larger concern than intentional misuse. Therefore, this shows a lack of proper medical education and awareness among the general population. These studies suggest that patients commonly mistake normal or benign symptoms for more insidious conditions.

Stemming from these hypotheses, many attempts have been made to attempt to alleviate the burden being placed upon the nation's EDs. Many of these studies have targeted a specific population and have had mixed results. One study found that by better educating low-income parents, the number of times they took their children to the ED was reduced by 58% (Herman & Jackson, 2010). Additionally, another study examined ED use by the elderly and, in addition to understanding why their rate of use is higher than the average population, attempted to address it. For this elderly population, the best predictor of ED use was whether or not they had a primary care physician (PCP) and how much they visited them (Ionescu-Ittu et al., 2007). In other words, when patients have additional education about health and/or have a PCP, ED use is less common.

The lack of studies dedicated to pregnancy and ED use is surprising. Outside of the late stages of life, for the average person pregnancy has the highest concentration of medical care (Creanga, 2017). This is due in part to the large number of bodily changes that occur during pregnancy and pose potential health risks. Therefore, it can be expected that there is the potential for emergent medical care to be sought at an above-average rate during this time. While sufficient prenatal care and regular contact with a doctor is vital during pregnancy, not everyone is able or willing to have such care. Without such care, it is less likely that an expectant mother will be able to differentiate between normal and abnormal conditions.

Therefore, it is more likely that they may seek emergency treatment for a condition that is otherwise normal.

Prenatal Care

Prenatal care has been found to be one of the most important needs during pregnancy. A study conducted at Louisiana State University compared outcomes for women and their newborns who received prenatal care with those who did not. This study found numerous deleterious trends for those who did not receive prenatal care. STDs, HIV, miscarriage/stillbirth, and premature delivery were all found to occur at a higher rate in women who did not receive prenatal care compared to their counterparts (Maupin et al., 2004).

What constitutes the ideal amount of prenatal care has long been debated within obstetrics. A study conducted in 2016 sought to test the current American Congress of Obstetrics and Gynecology (ACOG) recommendation of at least 12 prenatal visits. The results of this study found that the recommendation was accurate (Carter et al., 2016).

While the amount of prenatal care is an important factor to consider the timing of care is just as important. The time in the pregnancy when prenatal care begins has been shown to have a major impact on pregnancy complications and outcome. For example, a meta-analysis of existing research concluded that delayed prenatal care was associated with poor outcomes, mainly a shortened gestational period, low birth weight, and smaller newborn size. Additionally, lack of prenatal care was associated with harmful behaviors such as tobacco and alcohol use (Corman et al., 2018).

Due to the severity of the complications that delayed prenatal care can cause, extensive research has been done to examine the factors that cause prenatal care to begin late.

Socioeconomic status (SES) was found to be the best predictor of delayed prenatal care (Hajizadeh et al., 2016). Low SES, being a part of a minority demographic, and poor general health behaviors are associated with late prenatal care. Additionally, having no social support system was also found to be a major predictor. Even when health clinics were readily available for little cost to the patient, these barriers to early prenatal care still influenced the timing of seeking prenatal care (Hajizadeh et al., 2016). This suggests that availability is not necessarily the driving factor behind low prenatal care quality in low SES patients. A subsequent study was conducted to deduce what was behind this discovered trend. This study found that there were a common set of characteristics in pregnant women who sought care later in their pregnancy. These characteristics included low self-worth, mental illnesses such as depression, and subpar communication skills (Young et al., 1989). These characteristics, while prevalent throughout the entire population, have previously been found to be more likely to go unaddressed and untreated in low SES patients (Tooley et al., 2018). In other words, the lack of treatment of these underlying issues increases the risk of pregnancy complications and negative birth outcomes when individuals with these characteristics become pregnant.

Age at Delivery

The mother's age at delivery has traditionally also been a major predictor of pregnancy complications. Currently, the standards set by ACOG define birth mothers under the age of 17 or greater than 35 as high-risk. There are pregnancy complications unique to either group. Young mothers have an increased risk of morbidity, preterm delivery, and low birth weight (Torvie et al., 2015). Similarly, mothers over the age of 35 have been found to be at increased risk for preterm delivery, heart disease, and low birth weight among many other potential complications (Seoud et al., 2002). To summarize, pregnancy at either a young age or an older

age can lead to additional complications, and thus more ER visits, compared to a pregnancy at the median age.

Hypotheses

The research summarized above illustrates the possible harmful effects of too little prenatal care, delayed prenatal care, and advanced maternal age. All three of these factors have been shown to increase the complications throughout and after pregnancy. Additionally, it has been established that some of these behaviors, especially not seeking prenatal care, are correlated with a lack of awareness and education. These same factors were shown to be important influences in populations that frequent the ED at an above-average rate. As previously described, there has been little research looking for trends in pregnancy ED visitation. After combining the background information regarding ED visitation and that with pregnancy complications, the following hypothesizes have been formulated and will be evaluated:

Hypothesis 1: Total prenatal visitation will be negatively correlated with ED visitation.

Hypothesis 2: Late timing in prenatal visitation will be positively correlated with ED visitation.

Hypothesis 3: Maternal age will be negatively correlated with ED visitation.

Chapter 2: Methods

Sample

This thesis uses data from the Early Growth and Development Study (EGDS) which is a current, prospective and longitudinal twin study parent-offspring adoption study. Adopted children placed into their adoptive homes at birth, their birth parents, and their adoptive parents have been followed from when the child was an infant to adolescence. This has been a continuing study since 2002 and has increasingly expanded across the country to multiple universities with multiple recruitment points with families participating across the United States (Leve et al., 2019). Only birthmother data were used in this thesis as I was interested in factors influencing ED visitation during the pregnancy. The average age of the birth parents in this study is 24 years old, the average yearly income was $30,000-$40,000, and average education attained was high school diploma or equivalent (Leve et al., 2019). This study uses a total of 491 prenatal medical records from birth mothers participating in the EGDS. The sample includes records from a wide variety of medical systems around the country.

Procedure

Four hundred ninety-one prenatal medical records were coded in order to collect the relevant variables. Variables of interest were total prenatal visits, type of visit, and timing of the visit. An additional variable, age of the mother, was pulled from data already coded for the EGDS. The data was then sorted by whether the mother had at least one ED visitation. Of the original 491 records, 70 records contained at least one ED visitation and were used for the data analysis.

Measures

Total Prenatal Visits were counted using the prenatal birth record. Each visit was classified into six possible categories according to the type of visit that it was. Routine visits included those that included a report of the visit as described by the healthcare professional. Routine visits were also counted if there was no report but it was recorded on the standard prenatal flowchart.

Emergency Visits were those where the mother sought treatment in an ED, urgent care, or similar facility. Additionally, these included hospitalizations under 24 hours. Hospitalizations over 24 hours were recorded as their category. These were recorded as they appeared in the record but also if the primary care providers wrote that the birth mother visited the ED.

Timing of the prenatal visits was calculated for each birth mother using the first prenatal visit date and the delivery admission date. The first prenatal visit date was subtracted from the delivery admission date to provide a gestational age in weeks for the first visit.

Maternal Age of the birth mother was defined as the age of the mother at delivery. This data was retrieved from previous coders' data of the birth records.

Analysis Plan

In order to examine the associations proposed by the hypotheses regression analysis was performed. Three regressions were performed analyzing total ER visits by total medical visits, timing of the first prenatal visit, and maternal age.

Chapter 3: Results

The results of the initial regression examined the relationship between total visits with ED visits. Both were found to have a significant effect on total ED visits. However, there was no significant interaction between total visits and timing on ED visits (N = 70, R^2 = 0.0132, P = 0.3442).

Table 1: ED Visits Correlation with Total Visits

Number of Observations Read	70
Number of Observations Used	70

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.45310	1.45310	0.91	0.3442
Error	68	108.88976	1.60132		
Corrected Total	69	110.34286			

Root MSE	1.26543	**R-Square**	0.0132
Dependent Mean	1.77143	**Adj R-Sq**	-0.0013
Coeff Var	71.43572		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	1.56949	0.26041	6.03	<.0001
totalvisits	**1**	0.02915	0.03060	0.95	0.3442

The second regression examined the relationship between ED visits and the timing of the first prenatal visit. Again, no significant relationship was found (N = 70, R^2 = 0.0373, P = 0.1094)

Table 2: ED Visits Correlation with Prenatal Timing

Number of Observations Read	70
Number of Observations Used	70

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	4.11158	4.11158	2.63	0.1094
Error	68	106.23127	1.56222		
Corrected Total	69	110.34286			

Root MSE	1.24989	**R-Square**	0.0373
Dependent Mean	1.77143	**Adj R-Sq**	0.0231
Coeff Var	70.55830		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	**1**	2.36005	0.39238	6.01	<.0001
Timing	**1**	-0.30749	0.18954	-1.62	0.1094

The third regression was run to examine the relationship between total ER visits and age at delivery. No significant relationship was found (N = 70, R^2 = 0.0145, P = 0.3211).

Table 3: ED Visits Correlation with Maternal Age

Number of Observations Read	70
Number of Observations Used	70

Model	1	1.59761	1.59761	1.00	0.3211
Error	68	108.74525	1.59919		
Corrected Total	69	110.34286			

Root MSE	1.26459	**R-Square**	0.0145

Dependent Mean	1.77143	**Adj R-Sq**	-0.0000
Coeff Var	71.38830		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	**1**	1.15860	0.63149	1.83	0.0709
mma56001	What is the birth mother's age at delivery?	**1**	0.02480	0.02481	1.00	0.3211

Chapter 4: Discussion

The results suggest that there is no significant correlation between the number of ED visits and the variables of total prenatal visits, timing of the first prenatal visit, and maternal age at delivery. Therefore, as there were no significant interactions hypotheses one, two, and three must be rejected.

It was predicted that ED visits would be inversely related with the total number of ED visits. This hypothesis was formulated using the education theory posited by Oberlander et al. that was summarized in the introduction. Previous studies have shown that the more education a potential patient has about a nonemergent condition, the less likely they are to seek emergent treatment for it. However, these results did not support this theory.

It was expected that the number of ED visits would be positively correlated with the timing of the first prenatal visit for similar reasons. If an expectant mother waited until a late date, it was predicted that they would be less educated about their pregnancy. Additionally, it was anticipated that an expectant mother who did not find out until late would be less likely to have a regular healthcare provider and would rely on emergency services. However, this hypothesis too was not supported by the results.

Finally, it was expected that ED visits would be inversely related to maternal age. It was shown in the introduction that expectant mothers either relatively young or old are more likely to have complications. However, it was also shown that older expectant mothers would be more likely to be of a higher SES status and be more educated. Therefore, it was expected that they would be less likely to frequent the ED than a younger mother. Again, however, the results did not support this prediction.

Implications

The conclusions drawn from the results of this study give insight into what predictors exist for those likely to have insufficient prenatal care and those likely to compensate for it through the usage of emergency services. Overall, none of the suspected variables were found to be significantly related with ER visits. Therefore, this suggests that predictors of who seeks out ED services may be more complicated than single variables.

Limitations

There were several limitations with this study. The first was with the medical records themselves. The EGDS received records by contacting individual institutions that were associated with the prenatal care of the expectant mother. While this method was the only practical way of getting these records, it is only truly reliable for mothers who stayed in one area and with the same providers. There were multiple instances of incomplete records because the mother had moved providers and records from one institution could not be secured. This was additionally problematic for this study as, unless identified by the birth mother or PCP, it would be impossible to tell if the birth mother went to an ED outside of their health system and request her records. Another limitation of this study was the low sample size. As previously mentioned, 491 total records were coded, however, only 70 contained an emergency visit. This limits the generalizability of these findings.

Future Studies

This study raises many questions that could be examined through futures studies. As reported, the major significant finding of this study was that the timing of the first prenatal visitation was found to be significantly associated with total ED visitation. This leads to the obvious question of why this occurs. For example, a possible reason is that knowing about the

pregnancy earlier affords more time for additional ED visitation. Contrarily, however, it could be argued that those who discover later during the term are more likely to rely on EDs as their primary source.

Conclusion

This study provided key insight into the ED visitation habits of expecting mothers. This was an important study to undertake as despite being one of the major phases in life where consistent medical visitation is necessary, it has been understudied. While no significant relationships were found, this study provides valuable background and findings for future studies.

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