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# Comparing Intrapartum Interventions by Family Medicine Physicians and Obstetricians/Gynecologists in an Urban Academic Medical Center

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Walden University
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Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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## Abstract

In the United States, over the last four decades, medical interventions in labor were intended to be a rare practice, to be used only when the benefits of birth outweighed the risk to the pregnant individual and fetus. This study was conducted to compare obstetricians gynecologists and family medicine physicians (OB/GYNs and FMPs) in an urban academic medical setting and to identify if they were practicing in an evidence-based manner as recommended by their respecting professional bodies by assessing for (a) associations between provider type and intervention (such as induction and augmentation) and for (b) labor and delivery outcomes for low-risk healthy pregnancies. Archival data was obtained from a family medicine quality improvement project at an urban academic medical center. Diffusion of innovation theory was used to identify which provider types were adopters or laggards of the current American College of Obstetrician Gynecologists practice guidelines. The major finding of this study was that augmentation was used significantly more often by OB/GYNs than FMPs. FMPs showed a 22% decreased likelihood of augmentation than OB/GYNs. In addition, there was a 23% increase in the risk of a poor labor and/or poor birth outcome with induction. This study provides a framework for assessing and comparing the use of labor and delivery interventions among provider types and labor and delivery outcomes for healthy low-risk pregnancies and labors. Once the framework is applied, medical institutions should be able to make recommendations about best practices to improve outcomes in maternal health, including labor and birth. The positive social change is the improved overall health of the community.

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# Dedication

I dedicate this dissertation to my kiddos (Jaime, Brian, Sophia, and Preston), my incredibly patient husband Josh, my mom and Bob, my sisters, and my grandparents. The support and encouragement you have all given is immeasurable. We overshot the moon and landed among the stars.

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# Chapter 1: Introduction to the Study

In the United States, over the last four decades, medically enhanced labors were intended to be a rare practice, except when the benefits of birth outweighed the risk to the pregnant individual and fetus (Cunningham et al., 2018). The most common labor and birth interventions used in a hospital setting are labor induction and labor augmentation. Inductions are reportedly used in the labor and birthing process up to 55% of the time, depending on the setting and geographic area of the U.S. (Cunningham et al., 2018). The practice of augmentation has been found to be used in 1 out of every 4 labors (Cunningham et al., 2018). The current use of labor induction and augmentation does not follow best practices, and often patients are not provided with a full understanding of the risks (Simkin, 2017). Routine and non-medically indicated induction and augmentation increase maternal and neonate mortality and morbidity (Avery, 2017, & Mayberry et al., 2017).

The use of high-technology practices (overuse of labor interventions) is common (Simpson, 2017) and not only carry an increased risk of harm (Chalmers & Dzakpasu, 2015), it also increases the cost of care (Carlson, Corwin, & Lowe, 2017). Despite the 2017 American College of Obstetrician and Gynecologists (ACOG) practice guidelines on the use of induction and augmentation, and the adoption of the guidelines by the American Academy of Family Physicians (AAFP), routine, non-medically indicated inductions and augmentations remain common place in many hospitals (MacDorman, Declercq, & Thoma, 2017: Mayberry et al., 2017: Shields, 2018: Simpkin, 2017: & Simpson, 2017).

Rosenblatt et al. (1997) provided a seminal framework for understanding how obstetricians gynecologists (OB/GYNs) are more likely to use induction and augmentation than family medicine physicians (FMPs) and midwives (Mayberry et al., 2017). Mayberry et al. (2017), Simpkin (2017) and others have shown that providing care in a risk-adverse setting has led to an increased routine use of induction and augmentation, without increasing positive labor and birth outcomes for the birthing dyad. Simpkin (2017) has suggested risk-aversion may be rooted in physicians' fear of litigation, in peer pressure, or aligning with practice setting standards and policies. Allen et al. (2004), Brown (2019) and Zahran et al. (2019) have highlighted the economic implications of induction and augmentation, including the increased costs and risk to human potential.

Family medicine physicians and midwives, when working in the same settings, have demonstrated similar, if not better, labor and birth outcomes with fewer interventions and less risk (Young, 2017). It is unclear if the setting itself is indicative of risk. In this research study, I examined the alignment of practice methodologies between provider types in an academic setting, which by nature, is a center of learning. This unique setting may allow for freedom of practice to allow the teaching of a variety of techniques, by a variety of provider types (OB/GYN, FMP, midwife) to all obstetrical physician-learners (FMP, OB/GYN, and in some settings, midwives). However, further research is needed to compare OB/GYNs and family medicine physicians or/and residents, in academic settings (Aubrey-Bassler et al., 2015; Carlson, Corwin, & Lowe, 2017; Mayberry et al., 2017; Young, 2017).

Leading public health organizations and maternal and infant health organizations have stated we "are failing our moms and babies" (AAFP, 2018; ACOG, 2017; CDC, 2016; Office of Disease Prevention and Heath, 2018). Despite the calls for a move towards evidence-based physiological birth among all obstetrical provider types, the use of routine labor induction and augmentation continues (ACOG, 2017; Aubrey-Bassler, 2015; Carlson et al., 2017; Mayberry et al., 2017). A live birth is among the top three most profitable admissions and procedures in a hospital setting. This varies based on payer source, hospital's primary population payer source (private insurance vs. Medicaid or state-based in insurance) and geographic area (Allen, O'Connell, Farrell & Baskett, 2004; Brown, 2018).

In recent years, there have been calls for additional research into labor and delivery practices (Mayberry et al., 2017; Carlson et al., 2017; Grobman et al., 2018), and their outcomes. ACOG (2017) and AAFP (2018) guidelines are created to ensure positive maternal and infant health outcomes, using best practices and evidence-based decision making. Nowhere else are evidence-based best practices more important than an academic medical setting (Young, 2017). Physician-learners (residents) are learning labor and birth methodologies and practices from multiple attending providers in a shared practice setting and building the foundation for their future obstetric practices (Coco, 2009; Young, 2017).

This study could improve labor and birthing management and practices and could improve the academic learning environment (medical school, residency programs, and fellowships). In addition, adherence to best practices could improve health outcomes by

reducing the risk of morbidities for the birthing dyad and by increasing the costs savings to both the healthcare system and the healthcare consumer (Carlson, 2017).

Previous researchers have looked at (a) provider behavior and induction and augmentation use, (b) institutional traditions and policy, (c) the balance of provider preference, (d) medical need versus convenience (AAFP, 2018; Aubrey-Blaser et al., 2017; Mayberry et al., 2017; Rosenblatt et al., 1997; Sadler, 2016; Zolotor, 2014). With the release of ACOG recommendations in 2011 (updated in 2017), providers who routinely use induction and augmentation have been cautioned. ACOG suggested that all obstetrical providers support laboring families with fewer medical interventions (ACOG, 2017: ACOG, 2011). Recognizing a need for evaluation of practices in academic settings, this doctoral project was developed to evaluate the association between FMPs' and OB/GYNs' adherence to ACOG labor induction and augmentation guidelines in an urban academic setting.

## Background

The relationships between physician type, labor and birth intervention, and birth outcome have been subject to a wealth of research and evaluation since the mid-1970s (Avery et al., 2014). Rosenblatt et al., (1997) conducted a landmark study which indicated that not only are there differences in practice methodologies, but also that obstetrical patients of family medicine providers consistently have better outcomes. With numerous changes in the way obstetric care is approached throughout the discipline, and how obstetrical and intrapartum care is managed, it was important to reinvestigate current

practices (Aubrey-Bassler et al., 2015; Avery et al., 2014; Carlson, Corwin, & Lowe, 2017; Chalmers & Dzakpasu, 2015).

An increasing number of women are dying in the childbirth period in America (MacDorman, Declercq, & Thoma, 2017). Intrapartum care has been rooted in tradition, provider convenience, and routine (Mayberry et al., 2017). Prior to the mid-1930s, birth was primarily physiological and occurred in the home while under the care of a midwife or a family doctor. The few births that occurred in a hospital setting were restricted to those who could pay for it or when the health of the mother was in a critical state due to pathological reasons (Aubrey-Bassler et al., 2015; Cunningham et al., 2014; Rosenblatt et al., 1997). The midwifery model is based on the understanding that a biologically female body is built for pregnancy, and pregnancy and physiological birth is not a disease state (Jansen, Gibson, Carlson Bowels, & Leach, 2013).

The family medicine physician's obstetric model is similar to that of a midwife; pregnancy and birth use a physiological model until a pathological disease state (such as hypertension or diabetes) appears and a medical intervention is needed (Rosenblatt et al., 1997; Simkin, 2017). OB/GYNs were originally intended to address the pathology of disease states in the female reproductive system (Cunningham et al., 2014). With this in mind, obstetricians were intended to provide medical care to high-risk pregnancies and provide surgical intervention in pregnancy. Over the course of several decades (1940s-1970s), birth moved solely into the obstetrician's office and out of the family medicine and midwifery practices (Sheilds, 2018; Wiegers, 2013).

Further evaluation of current practice methods has been called for by Aubrey-Bassler et al. (2015), Grobman, Rice, Reddy, Tita, & Silver, et al., (2018), Mayberry et al. (2017) and others. Despite the amount of research and best practice guidelines, modern intrapartum care has yet to reduce induction and augmentation use (Chalmers & Dzakpasu, 2015; Mayberry, et al., 2017). With an overall lack of quantitative scholarly study into the association between provider type and induction and augmentation use, a gap in the literature developed (Aubrey-Bassler et al., 2015; Gobman et al., 2018; Mayberry et al., 2017). I sought to address the gap through a regression analysis of the association between labor induction and augmentation, provider type and status, and outcomes in an urban academic setting.

## Problem Statement

The continued use of routine labor induction and augmentation practices have been indicated as unnecessary and potentially hazardous for the birthing dyad (Aubrey-Bassler et al, 2015). Leading organizations in maternal and infant health, including the American College of Obstetricians and Gynecologists (2017) and the American Academy of Family Physicians (2015), have indicated the need to reduce intrapartum interventions and move towards a practice of physiological birth over that of a medicalized one.

As indicated by Aubrey-Bassler et al., (2015), Mayberry et al., (2017), and the landmark study conducted by Rosenblatt et al. (1997), a gap exists in the understanding and research of intervention use in U.S.-based provider types and in academic settings. Through this study, I sought to test the association between labor induction and augmentation use by provider type and their subsequent effects on birth outcomes in an

urban academic setting. In addition, I sought to identify induction and augmentation use among provider types. The goal was to help identify provider types and provider status practice methodology adherence. Understating who (type and status) is using induction and augmentation can assist department decision makers with ensuring that physician-learners are following practice methodology and best practices, and that they can reach Healthy People 2020 goals.

In the study findings, potential improvements in evidence-based practices may be identified. These findings could lay the groundwork for a policy within teaching institutions that allow for provider type (FMP, OB/GYN, and midwives) to practice within their unique practice methodologies, encourage comanagement between provider types for low-risk deliveries, and to increase human capital while reducing medical costs to the system.

Variations exist between the ways in which obstetrical care is provided and expected (Avery, 2014; Rosenblatt et al., 1997), and the variations that occur within specialties and between institutions further weakens the use of best practices. Rime et al. (2004) identified the potential bias and risk of provider preference, which can influence the physician learners' use of interventions. In addition, Rime et al. (2004) asserted that the physicians who favor interventions may be more likely to work in an educational setting. This bias can result in future physicians who have learned to practice obstetrical care in a manner that is not consistent with best practices, patient autonomy, or patient-centered care. Overmedicalization of labor and birth are results of these practices (Mayberry et al., 2017).

## Purpose of the Study

The purpose of this study was to evaluate whether an association exists between the way FMPs and OB/GYNs use labor induction and augmentation. The dataset was analyzed to identify differences in induction and augmentation, outcomes of births that do and do not use induction and augmentation procedures by provider type and status. This study was retrospective and did not have a control study population.

The variables included patient demographics, provider type, intervention used, and possible outcome.

Descriptive statistics

- Participant demographics (age, marital status, primary language spoken, insurance status, number of pregnancies, living children, previous delivery type(s))
- Provider status (resident, attending)

Independent variables

- Provider type (FMP, OB/GYN)

Dependent variables

- Labor induction type (Pitocin, Foley/Cook, Carvedilol, Cytotec)
- No labor induction
- Labor augmentation type (Pitocin, Foley/Cook, AROM)
- No augmentation
- Outcome (delivery method, maternal complication, NICU admissions, APGAR score)

## Research Questions and Hypotheses

1. Is there a significant association between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies?

   *H*1 A significant association exists between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies.

   $H_{01}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies.

2. Is there a significant association between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies?

   *H2* A significant association exists between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies.

   $H_{02}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies?

3. Is there a significant association between provider type (family medicine and OB/GYNs) and augmentation in healthy pregnancies?

   *H3* A significant association exists between provider type (family medicine physicians or OB/GYNs) augmentation in healthy pregnancies.

   $H_{03}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and augmentation in healthy pregnancies?

4. Is there a significant association between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies?

*H4* A significant association exists between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

$H_{04}$ No significant association exists between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

5. Is there a significant association between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies?

   *H5* A significant association exists between augmentation and labor delivery outcomes for the birthing dyad in healthy pregnancies.

   $H_{05}$ No significant association exists between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

## Theoretical Framework for the Study

E.M. Rodgers developed the Diffusion of Innovations theory (DI) in 1962. DI is widely recognized among the oldest social science theories (LaMorte, 2018). In its origins DI explained how ideas diffuse (spread) within a system, place, or population. DI theory can provide a framework for an explanation of who uses a new behavior or idea and why some people adopt the behavior sooner than others (LaMorte, 2018). DI theory offers an opportunity to identify an association between variables that may predict the adoption of one variable over another (Glanz, Rimer, & Vinswanath, 2015). DI explains five types of adapters: innovators, early adopters, early majority, late majority, and laggards.

When used in this manner and setting, DI theory could identify adherence to evidence-based practices (induction and augmentation use when medically indicated and

according to ACOG standards), who adheres to these practices (provider type and status), and the possible negative outcomes due to a lack of adherence in an urban academic setting. With DI theory, it may be possible to identify which provider types and statuses are adopters or laggards with respect to ACOG (2017) guidelines of labor induction and augmentation type. The association between the adoption of new ideas or practices (ACOG guidelines) in the healthcare setting are discussed in-depth in Chapter 2.

## Nature of the Study

Archival data were collected from a 5-year chart review of low-risk and low–moderate-risk labors. Regression methods were used to analyze and interpret the data. The dataset was gathered through a quality improvement project conducted internally by an urban academic delivery institution. The dataset included (a) information on patient demographics, provider type and status; and (b) de-identified labor flow sheet information including admission reason, diagnoses, medications, laboratory results, medical procedures, surgical procedures, birthing dyad outcome, chief complaints, and discharge information.

Descriptive statistics and regression analysis were used to compare the use of induction and augmentation by provider type and status, and delivery outcome for the birthing dyad. Descriptive statistics included in this study are patient and provider demographics, which were used to identify maternal groups (e.g., age groupings, primary pregnancies) and provider status (e.g., attending or resident). In addition, descriptive statistics were used to identify subgroups such as birth outcomes in maternal age, insurance status; and to provide a snapshot of the population of expectant families this

institution serves. This information would be needed for study replication or comparison. The independent variable was the provider type (family medicine, OB/GYN). Dependent variables were labor induction type, labor augmentation type, and outcome (delivery method, maternal complication, NICU admissions, APGAR score). Variable groups were also be analyzed to identify associations between the provider type and induction and augmentation; induction and augmentation use and intrapartum outcome; and the association of provider type on intrapartum outcome.

## Definitions

The following words and terms may require defining for those unfamiliar with medical terminology and maternal/child health.

*Attending physician*: A physician who supervises the ongoing care of a patient provided by a resident, medical students, and interns. (Attending Physician, n.d.).

*Augmentation*: the enhancement of inadequate spontaneous contractions which are considered inadequate due to a lack of cervical dilatation and or fetal descent (Cunningham, Leveno, Bloom, & Dashe, et al., 2018).

*Dyad*: a pair, or two units treated as one such as a pregnant person and the fetus or the delivered person and the neonate (Dyad, n.d.).

*Induction*: the stimulation, with or without ruptured membranes, of contractions before spontaneous labor has begun (Cunningham, Leveno, Bloom, & Dashe, et al., 2018).

*Intrapartum*: the time during labor and delivery, or childbirth period (Intrapartum, n.d.).

*Labor stages*: Labor is the process which leads to childbirth and occurs in three stages. The first stage is the time of active uterine contractions and cervical change. Stage two occurs with complete cervical dilation and the delivery of the newborn. Stage three is the delivery of the placenta (Cunningham, Leveno, Bloom, & Dashe, et al., 2018).

*Neonate*: an infant less than 4 weeks of age. (Neonate, 2019)

*NICU*: Neonatal Intensive Care Unit for preterm neonates, or neonates who require special care. (NICU, 2019)

*Resident*: an M.D. in specialty training (Harvard, 2019).

## Assumptions

The source of the study data was electronic medical records, which were assumed to be accurate and reliable.

## Scope and Delimitations

For this study, the scope included provider type, provider status, labor induction and augmentation, birthing dyad outcomes, and data collected between June 1, 2013 and May 31, 2018.

Delimitations included not looking at data from hospitals and academic delivery centers other than the studied center, from interventions besides induction and augmentation, from other provider types, from pregnancies and labor and births that were considered moderate- and high-risk, from mothers with diagnoses that were not typically cared for by a FMP such as gestational diabetes, multiples, or pre-eclampsia.

## Limitations

The results of this study may have limitations which are beyond the control of the researcher, such as accuracy of the medical record, the way in which the data were obtained (through an internal quality improvement effort) and the setting the dataset was obtained from (academic medical center). For example, since the dataset was from one urban academic medical center, the results may not represent the practices in any other academic or delivery facility, and the medical record may be incomplete due to physician-learners and medical students entering a large portion of the medical documentation (Panacek, 2007). Also, the induction and augmentation methods studied are used only during the intrapartum period; nonmedical interventions taking place outside of the hospital may take place during the prenatal period and could impact the intrapartum outcomes.

The results of this study are limited to quantitative data retrieved from one internal quality review project. The retrospective dataset included, in its entirety, a 5-year period that contains data which is excluded from the study. The data exclusions included patients of providers who do not deliver at the institution, patients who live outside of the metropolitan area, patients who fall into the high-risk and moderate-risk care categories (diabetes, hypertension, multiples e.g., twins), and patients who received no prenatal care.

## Significance

The significance of this study is twofold. The first is the examination of the ways in which different provider types use induction and augmentation during the intrapartum period. Family medicine and OB/GYN providers adhere to the same basic ACOG

standards. However, FMPs are less likely to take a medicalized approach to labor and birth and avoid the potentially cascading effects of interventions such as induction and augmentation, resulting in a better outcome for birthing dyad (Aubrey-Basler, 2015; Carlson, 2017; Mayberry et al., 2017; Simpkin, 2017). Researchers have evaluated the practice similarities and differences of family medicine and OB/GYNs, along with the outcomes of specific induction and augmentation techniques. However, there has been no research on induction and augmentation in an academic learning environment, or evaluation by provider status and type in an academic medical institution.

Second, the use of DI theory in this study provided a snapshot of one institution and the providers within that institution, and their ability to adopt and use ACOG standards of induction and augmentation use. The results of this study could provide (a) a framework for the way future physician-learners use interventions, (b) an understanding of the likelihood of adoption of current evidence-based standards in an academic institution, (c) an understanding of adherence to ACOG practice guidelines, and (d) the impact of guideline adherence on the birthing dyad.

As a result, the physician-learners would leave their medical training with a comprehensive background in evidence-based best practices and the skills to manage a physiologically normal birth with little to no medical intervention. Physician-learners could begin their medical practices working within practice guidelines and may become early adopters of new practice guidelines as a result. In addition, if the physician-learners intend to become an attending physician or professors of medicine, they would be

handing down a legacy of evidence-based best practices and guideline adherence, allowing their students to learn in an environment with best-practice adoption.

## Summary

In Chapter 1, an overview of the use of induction and augmentation was provided with a DI theory perspective. Obstetrical providers are expected to follow the use of induction and augmentation, with the desire to provide the best possible care and best possible outcome with limited risk to laboring and birthing families. Routine induction and augmentation are commonplace, reaching a high of one in four labors induced or augmented (Cunningham et al., 2018).

With this research is intended to answer the question: Is there an association between provider type and induction or augmentation, provider type and status, and is there an impact on the labor and delivery outcome for the birthing dyad? Retrospective archival data from an urban academic medical institution were analyzed using regression models in SPSS. In this study, descriptive statistics include patient demographics and provider status. The independent variable was provider type, and the dependent variables were labor induction, labor augmentation, and birthing dyad outcome.

Previous researchers have identified a need for additional research in the use of labor induction and augmentation on birthing outcomes, and how providers use labor induction and augmentation (Mayberry et al., 2017; Sadler, 2016). Obstetric care in labor and birth is a delicate balance between risk, medical need, physiological process, and patient desire (Sadler, 2016; Sword et al., 2012). In this study I sought to test the

association between labor induction and augmentation, provider type and status, and the birthing dyad outcomes at one urban academic institution.

# Chapter 2: Literature Review

## Introduction

The way in which modern prenatal care has been approached is rooted in a multitude of sources. These include (a) the professional association and its prenatal care and labor management guidelines for each prenatal provider type, (b) preconceived ideas of prenatal care and labor management, and (c) institutional guidelines at each care setting (Mayberry et al., 2017). Complicated by multiple care providers during the labor process and their individual ideologies, interventions can become routine with blanketed use (Zolotor, 2014). Current standards, individual and organizational personalities, and policies have clouded the labor and delivery care landscape, creating an increasingly risk-adverse provider centered care setting. The uniqueness of each individual pregnancy, labor, and birth brings challenges of how to provide the best care for the dyad (Aubrey-Bassler, 2015).

This literature review covered five areas and the relevant methodology. In the first section I identify the methods used to locate the literature. In the second section I review the medicalization of labor and delivery. In the third section I highlight the differences in how the type of provider, specifically FMP and OB/GYN, view and provided obstetrical care. In the fourth section, I address the association between the provider type and labor and birthing dyad outcomes for low-risk pregnancies. The association between intervention of labor induction and augmentation and the provider type is reviewed in the fifth section. In the sixth section, I review the labor induction and augmentation and the

labor and delivery outcomes in current literature as well as the medicalization of labor and birth.

## Literature Search Strategy

Multiple databases were used to identify publications for this literature review: PubMed, Google Scholar, MEDLINE, Thoreau, ScienceDirect, ProQuest, and BioMedCentral. The following key words were used alone and in combination: *family medicine, family physician, obstetrician, obstetrician–gynecologist, obstetrics, obstetrical, prenatal care, intervention, labor and birth, outcomes, birthing dyad, birth*. I searched for current publications from 2012 to 2017, but very few were found. Once the dates were expanded to 1990-2017 multiple publications were identified. Few articles comparing OB/GYN and FMP intervention use between specialties have been conducted in the United States. However, once the search was expanded to a general comparison of OB/GYN and FMP, the body of literature expanded. All articles and publications located in the search were reviewed, and the relevant publications were included in the literature review.

## Theoretical Foundation

Diffusions of Innovation (DI) theory were used for the framework of this study. DI theory was developed by Rodgers in 1962 as a method to describe the patterns of innovation acceptance in agriculture. With origins in social science, diffusion of innovations is applicable in multiple settings. The theory was developed on the premise that innovations diffuse in an S-curve pattern, spreading in a quick fashion throughout a wide landscape (Rogers, 2004). The change agents are those who are early adopters,

thought and opinion leaders, and those of great influence (Glanz, Rimer, & Viswanath, 2015).

In healthcare, DI theory can explain the adoption, or lack of adoption, of an innovation or new practice in a healthcare setting. With the contradictions of traditional, routine healthcare procedures, and the rapid changes in healthcare practices, it is no surprise that innovative ideas may not take hold as expected. As Walsh (2007) has stated, the adoption of clinical behaviors or practices in a healthcare setting are dependent on the acceptance of five elements specific to healthcare: relative advantage, compatibility, complexity, trialability, observability. In this study, I looked at the way in which healthcare interventions, specifically the adherence of ACOG guidelines regarding labor induction and augmentation, are used in an academic labor and delivery setting with OB/GYN and FMP physicians.

DI can be applied to a healthcare setting through the way in which our institutions adopt evidence-based practices. The innovation being studied is the adherence to ACOG guidelines for induction and augmentation use. According to ACOG, induction and augmentation should be used only when medically necessary and when practice guidelines have been met, such as urgent need to deliver due to preeclampsia or patient is >39 weeks gestation and has as favorable cervix (ACOG, 2018). Using the DI, I sought to address the way in which interventions are used, which group uses the interventions more often, a clinical look at the medically indicated reason for the intervention, a comparison of labor and birth outcomes for both provider groups, and the frequency of intervention use by resident physicians compared to attending physicians.

## Literature Review Related to Key Variables

### Maternal and Infant Health in Public Health

Maternal and infant health have been a staple indicator of the health of a population, community, region, and nation (Kaiser Family Foundation (KFF), 2018; Wilkerson & Pickett, 2010), yet, in public health research, maternal and infant health have not been a focal point of funding until the last decade. However, the current administration has suggested funding will be reduced (KFF, 2018). Infant mortality research may be researched more than other areas, however, even that is limited. Bodies of health experts, and the ODPHP and ACOG, have included limited intervention use such as the reduction of labor induction at <39 weeks (AOCG, 2017; Lu & Johnson, 2014; ODPHD, 2018) as a method to positively impact the indicators.

As ACOG, AAFP, and AAP statements indicate the need for the reduction of interventions and the de-medicalization of labor and birth to reduce early term births, primary cesarean sections, and infant and maternal health morbidity and mortality (Lothain, 2014; Mayberry et.al., 2017). This directly impacts the achievement of Healthy People 2020 Maternal Child Health indicators 1,5,6,7,8, and 21, and are among the standard care guidelines of and practice methodology of FMPs (ODPHD, 2018; Shields, 2018). Labor and birth interventions have been correlated with poor labor and birth outcomes including early term births, increased primary cesarean sections, reduced breastfeeding rates, and increased risk of maternal mortality and morbidity (Lothain, 2014; Mayberry et al., 2017). HP2020 MCH 1, 7, 8, and 9 have included the reduction of

labor induction at <39 weeks (Lu & Johnson, 2014; ODPHD, 2018) as a method to positively impact the indicators.

The way in which a provider utilizes interventions and medical procedures during the labor and birthing period may have a profound effect on the outcome of the birthing dyad (Carlson, Corwin, & Lowe, 2017). Maternal and infant mortality and morbidity are public health indicators of how we as a nation are faring and are impacted by birthing practices. This results in a public health priority when evidence-based practice is not used the birthing dyad are placed at a greater risk of complicating health factors, including when medicalization in birth occurs due to convenience and routine instead of need and best practice (Avery et al., 2017; CDC, 2016; KFF, 2018)

HP2020 Maternal Infant and Child Health Indicators provided guidance based on data obtained through national and state databases and vital statistics records (ODPHD, 2018). Among the 33 indicators are six indicators which were directly impacted by how obstetric and labor and birth care is practiced:

- MICH-1Reduce the rate of fetal and infant deaths
- MICH-5 Reduce the rate of maternal mortality
- MICH-6 Reduce maternal illness and complications due to pregnancy (complications during hospitalized labor and delivery)
- MICH-7 Reduce cesarean births among low-risk (full-term, singleton, and vertex presentation) women
- MICH-8.1Reduce low birth weight (LBW)
- MICH 9 Reduce preterm births

MICH indicators 1, 5, 6, 7, 8, and 9 are indicators that can be affected by intrapartum care, including the type of physician and use of interventions (Aubrey-Bassler et al., 2015; California Maternal Quality Care Collaborative, n.d.). With the increased use of intrapartum interventions, the risk of infant and maternal morbidity and mortality is increased (Aubrey-Bassler et al., 2015). To understand the impact, there must be an understanding of how interventions are used and why. The use of interventions as standard practice could be a contributing factor to the poor fetal, infant, and maternal outcomes on the rise (ACOG, 2017; Aubrey-Bassler et al., 2015).

**Medicalization of Labor and Delivery**

The routine uses of technology and interventions in birth, such as induction and augmentation, when not specially medically indicated, plays a larger role in poor outcomes, including mortality and morbidity for mother and baby (Young, 2017). The use of few medical interventions or relying on physiological interventions has shown to be an evidence-based and safe practice for low-risk pregnancies and deliveries (Carlson, Corwin, & Lowe, 2017; Chalmers & Dzakpasu, 2015). A reduction in medicalized interventions has been desired by both prenatal care providers and families; however, this desire is often not realized (Mayberry et al., 2017)

Modern-day obstetrical care is filled with costly technology and risk mitigating behaviors supposedly aimed solely at reducing risk which are often informed by practice habits and/or hospital policies. Standard practices are often informed by preference and favor, over evidence-based and best practices putting families at risk. Despite the risk-adverse setting, healthy patients are increasingly exposed to unnecessary risks, often

without medical indication (Lothian, 2009; Simpkin, 2017). Obstetric practices have been formed from a multitude of sources and philosophies, including; patient and provider informed opinions, institutional and professional associations, organizational policies and preferences, and insurance reimbursement (Rime et al, 2004).

The move away from physiological birth and towards a medicalized disease-based model, has resulted in a shift of fewer families and providers experiencing physiological normal birth and increased the idea of the medicalized labor and birth as the norm (Simkin, 2017). As a result, families and providers are not fully aware of the risks of the introduction of each intervention (Aubrey-Bassler, 2015). The cascading effect of labor interventions, lack of training in physiological labor, and a reliance of machines to determine labor progress, has resulted in the acceptance of women's bodies 'failing' (Mayberry et al., 2017). Resulting in a lack of trust in the birthing process, and an increase of families and providers who are not fully aware of the risks of the introduction of each intervention.

Obstetric care will always include risk mitigation; there will always be patients who require a higher acuity of care. However, the majority of pregnancies will be healthy and of low medical risk (Aubrey-Bassler, 2015; Mayberry et al., 2017). Obstetrical care governing bodies agree that evidence-based medical care that aims to reduce interventions and increase health outcomes are ideal (Simkin, 2017). Implementation of recommendations from these bodies has been slow, regardless of the potential life and cost saving measures that could result from the reduction of ineffective and non-medically indicated intervention use (Simkin, 2017).

As Carlson (2017) and others have indicated, technology heavy, intervention heavy and costly care can be reduced by allowing for physiological management of labor and birth. Labor and birth interventions can be lifesaving when needed, however, not every birth is a medical emergency. As medicalized birth becomes the norm, this puts expectant families at risk for routine versus individualized medical care in obstetrical and delivery practices. Through this research, I sought to identify differences in the way OB/GYN and FMP providers in an urban academic setting provide care and use interventions during the intrapartum period.

## Provider Types

### *Obstetrician/Gynecologist*

The OB/GYN model of care for the pregnant woman is solely focused on the pathology of pregnancy and not pregnancy as a continuation of the life course (Avery, 2014). OB/GYNs as practitioners are highly specialized in the care and treatment of obstetrical risks, complications, and those at risk of adverse obstetrical outcomes. Through the shift of birth moving from home to hospital, family medicine and midwifes were no longer considered the standard, the OB/GYN became the leading provider during the course of obstetrical care (Avery, 2014).

Due to this shift, pregnancy as a normal physiological event transformed into a pathological condition with increasing technological interventions (Weigers, 2003). Accompanying this shift in care, came a shift in mindset of who was best suited to provide obstetrical care, the OB/GYN specialist, the midwife who follows a physiological life course approach, or a family medicine physician. With

the continuation of the introduction of technology and the medicalization of obstetrical care, the attitudes and competency of FMPs has been questioned in OB/GYN circles (Walsh, 2010).

As identified in 2014 by Avery, OB/GYNs hold unfavorable views of the ability for family medicine physicians to provide obstetrical care. Fewer than 50% of OB/GYNs reported that family physicians should provide prenatal care. Although it must be noted that of those who positively viewed FMPs, they also believed in the FMP's ability to handle most pregnancy complications. OB/GYNs, with a medicalized view, expected pregnancy to have complications, and assumed most if not all women will need assistance with labor and birth, including surgery to have a positive outcome (Eaton, 2014).

***Family Medicine Physician.***

The relationship between the OB/GYN and FMP has been, and in some areas, still is strained. The recent joint recommendations from them American Academy of Family Physicians an American College of Obstetricians and Gynecologist (ACOG, 2017), have stated a need for practice collaboration and common goals. The collaborative statements have not aided in reducing strained relationships. However, as indicated by Avery (2014), most OB/GYNs did not believe FMPs were qualified to provide obstetrical care. As Avery (2014) suggested, the adversarial relationships could be related to the shift of obstetric care from FMPs to OB/GYNs midcentury, which OB/GYNs seen as the only source of all prenatal care. As opposed to the OB/GYN as a specialist used to treat pathological (abnormal) pregnancy conditions (Avery, 2004; Rosenblatt et.al., 1997).

In comparison to OB/GYNs who provided pathological prenatal care (care for abnormal pregnancy conditions such as hypertension, diabetes, and multiple gestations, and fetal abnormalities), FMPs provided comprehensive care during the perinatal period to healthy individuals with low-risk pregnancies. Beyond caring for the pathological aspects of pregnancy, FMPs practiced in a manner that was patient-centered, provided individualized medical screenings, counseling, addressed social needs, and connected patients with resources they may need (Zolotor, 2014). The comprehensive nature of FMP care often resulted in lower costs, low intervention rates and positive health outcomes (Mayberry et al., 2017), and the practice methodology of FMPs maybe best suited for healthy pregnancies with low to moderate risk factors (AAFP, 2018; Aubrey-Bassler et al., 2015; Harris et al., 2015; Mayberry et al., 2017).

FMPs provided 20-28% of all women's preventive healthcare, dependent on region, in the United States (Kozhimannil, 2013) Despite the use of FMP for preventive services, obstetrical care services have continued to decline to roughly 7%. As with preventive care, there are regional differences with the North and Pacific Northwest in with the highest percentages (ranging from 25-35%) and 5% in the Mid-Southeast (Kozhimannil, 2013). Kozhimannil (2013) also identified that roughly 34% of pregnant women saw a FMP for medical care, although not for prenatal care. The decline of FMPs providing obstetrical care began in the 1970's, with the number of FMPs who provide prenatal care around 10% since 2010. All FMPs are trained to provide basic obstetrical care, however, of those who provide obstetrical care, 10% of their time is dedicated to

providing care (Tong, 2012). Tong (2012) highlighted the need for increased access to obstetrical care in FMP practices.

Avery (2014) had found that FMPs are capable of providing full-service prenatal care and labor and delivery services, including high-risk care and surgical deliveries. FMPs practicing high-risk and surgical care are often found in rural and underserved areas. Through the research in Avery (2014), Kozhimannil (2013) is supported in the discussion of FMPs unique ability to coordinate care, provide specialty care, and reach populations who lack regular access to medical care. Young (2017) highlighted this aspect with the finding of 63% of all maternity care providers in rural settings are FMPs.

With the decline of FMPs providing obstetrical care, there was also a decline in programs providing residency and fellowships in general and specialized obstetrical care (Young, 2017). Obstetrical residency requirements for FMPs have been a topic of discussion, with a reduction in training and skill requirements, which may reduce the number of available FMPs (Tong, 2013). Despite the overall need of obstetrical care providers in the United Sates, hospitals and local practice politics have a role in the access to FMPs and the privileges they may have in urban hospitals (Kozhimannil, 2013; Young, 2017).

FMP residency programs have been shown to reduce the number of interventions and cesarean deliveries in academic institutions, when FMP deliveries are overseen by FMPs and not OB/GYNs (Coco, 2009). Coco's 2009 findings of FMP residents' outcomes increase with experience, training, and support by FMP attending physicians versus when supported by OB/GYN. Additionally, Coco (2009) supported the

continuation of FMP residency and fellowships in obstetrical care and surgical births. Young (2017), highlighted new efforts in residency programs which would support increased skills in specialized obstetrical skills. The support of FMP residency programs and FMP obstetrical services continues, despite the decline in FMP obstetrical providers (Tong, 2013). FMPs fill an increasing medical and obstetrical care provider gap in rural, underserved and vulnerable communities.

***Low Risk Pregnancy Labor and Delivery Outcome and Provider Type***

Managing labor and birth is increasingly occurring as if each dyad is deemed high-risk and requires highly specialized care (Aubrey-Bassler, 2015; Rosenblatt, 1997). In previous research, outcomes of care for provider type, Aubrey-Bassler (2015) had indicated similar relative risk in OB/GYN care compared to FMP care. However, as Aubrey-Bassler also indicated, those studies were small, and did not adjust for mitigating factors such as new learners and a mixed learning environment, although some studies were conducted in a mix practice setting (OB/GYN and FMP delivering at the same hospital).

In 1997 Rosenblatt highlighted the significance of mismanaging low-risk pregnancies. This included the overuse of interventions and the increased risk for complications and poor labor outcomes as a result. Over the course of 30 years, the situation has not changed. Aubrey-Bassler (2015), Murphy (2017), and Kozhimannil (2013) and more have continued to identify the risks of technological and intervention use when not indicated by best-practice or current evidence. Kozahimannil (2013) and Aubrey-Bassler (2015) examined the labor and birth

practices and the potential exposure of birthing dyads to unnecessary interventions in the name of policy and routine.

The acceptance of FMPs in the obstetrical care has not been widely adapted. Historically, midwives and FMPs were the obstetrical care providers, however, as Aubrey-Bassler (2015) and others have stated, this is not the current standard. FMPs, in the U.S. are seeing an increase in rural patients where they are the only care option, to a stagnation of less than 1/20th of births in urban areas.

***Labor Induction and Augmentation and Provider Type***

FMP and OB/GYN providers care models, while similar, do differ in how care is provided. As identified previously, FMPs use a model commonly referred to as "expectant care" (Avery, 2014) or low intervention use. In contrast to FMPs, OB/GYNs are more aggressive with treatments and interventions leading to a medicalized process, which for healthy pregnancies, has not led to improved outcomes. Aubrey-Bassler (2015) had identified sample size flaws and intrinsic bias in earlier studies which indicated similar outcomes between the two provider types. Carlson (2017) has also identified the lack of diverse settings of current and past research. Which lends support to my basic research question; is there a difference between FMPs an OB/GYNs intrapartum use interventions to induce or augment labor in academic settings with resident physician learners?

Provider bias in intrapartum care methods, including induction and augmentation use, has been noted in several studies. Eaton (2014) and Balyakina (2016) have found the bias effects not only in the use and type of interventions, but also the way in which

expectant families trust their providers, view their births as positive or negative, infant feeding practices, but also the view of how capable one provider type is over the other of providing quality safe care. In a delivery setting which houses two or more delivering provider types (FMP, OB/GYN, midwives), professional attitudes may influence hospital policy, intervention policies and procedures, and quality of care (Eaton 2014; Balyakina, 2016). Simkin (2006) and Walsh (2010) and others have found the bias leads to antagonistic work settings which negatively impacts interdisciplinary collaboration and may negatively impact the patients.

Over the course of four decades, the obstetrical care FMPs provide has been researched. As Avery (2014), and others described in this literature review, FMPs use fewer interventions, perform fewer operative vaginal deliveries, and allow for spontaneous labor more frequently. Avery found that FMPs provide high-quality care with fewer interventions. Supporting Avery's findings, MacDorman et al. (2014) found laboring individuals felt more pressure to accept interventions (such as induction, epidural, cesarean section) with an OB/GYN versus an FMP as the care provider, three times as many laboring individuals who felt pressured received the intervention.

In 2017, ACOG released a committee opinion which supported a low intervention or "expectant care" model for all pregnant women, regardless of their risk factors. The statement supported patient autonomy, informed consent, care collaboration, and supporting the laboring individual in her labor and birthing goals. ACOG clearly stated that "Many of the current common obstetric practices are of limited or uncertain benefit

for low-risk women" ACOG further stated that shared decision making is the goal for individuals in all stages of labor.

ACOG's statements provide practice guidance for all obstetrical care providers, these statements are rooted in evidence, practice methodology, and best-practices (ACOG, 2017). However, the as noted above and in additional sections of this chapter, ACOG's guidance in low intervention and patient autonomy is not as routine as intervention use is. Identifying a provider's practice and implementation of the 2017 ACOG guidelines is especially important in academic medical centers. A failure to follow evidence-based guidelines in such a setting could result in the next generation of obstetric providers practicing in a manner that is not aligned with current standards (AAFP, 2018; Aubrey-Bassler et al., 2015; Avery et al., 2014). In addition, practice methods have the potential to affect the efforts to reach HP2020 health indicator goals for MICH regionally and nationally.

***Labor Induction and Augmentation and Labor and Delivery Outcome***

The consistent use of routine interventions without clear medical indication has resulted in the interruption of a normal physiological process. The cascade effect of each individual intervention leads to more interventions, resulting in a medicalized labor and birth and an increased potential for a surgical delivery (Jansen, 2013). The physiological process of labor and birth begins when a baby that has reached a level of significant lung and brain maturity, emitting hormones which trigger the pregnant individuals' body to enter into labor. This process, in healthy low-risk

pregnancies, allows for an ideal transition from womb to outside of the womb with little risk of harm for baby or laboring individual (Lothain, 2009).

Unnecessary interventions interrupt the process, putting the dyad at risk of poor outcomes. Mayberry et al. (2017) reviewed the most recent guidelines from obstetrical care organizations (ACOG, AAFP, ACOM) collectively (in individual and collaborative statements) stated the need for "judicious" intervention use, allowing the physiological process to take place, emphasis the importance of shared decision making. With the focus shifting from provider centric care, to patient centered and autonomous care the future of obstetrics should align similarly with each provider type (Mayberry et al., 2017).

Commonly used with inductions and augmentation, continuous electronic fetal monitoring is among those with the highest risk of negative outcomes and resulting in harm (Mayberry et al., 2017; Romano, 2008). Despite the numerous studies, including (Romano, 2008) on the effectiveness of continuous electronic fetal monitoring, it is a routine and standard practice written into some practices policies. Mayberry et al. (2017) echo's Romano's concerns and includes additional intervention methods (e.g., induction, augmentation, epidural) as initiating the "perinatal paradox" Rosenblatt (1997) had identified. The paradox occurs when interventions are added without recognizing the financial and physiological costs involved, and the often negative or limited effect on the labor and birth outcome for either member of the dyad.

***Non-Provider Influence on Induction and Augmentation***

This study does not seek to evaluate the cost of induction and augmentation, or to address human capital costs of poor birth outcomes. However, it must be acknowledged that there may be driving factors beyond best-practices and safety. In addition to physician type and practice methodology, hospital policy and profit tables are also influencers. Live birth hospitalizations are ranked as the second and previous C-sections as the 16th most expensive admission for private health insurance payers, (Torio & Moore, 2016). When looking at Medicaid costs, a live birth is the largest expense at $6,619 (with a payout of slightly less than half of that of private insurance) and C-section as the 8th most costly. When the impact of cost with the uninsured population, live birth is the 16th. Overall, a live birth is the third most expensive medical condition/hospital admission in the US (Torio & More, 2016).

As Allen, O'Colleen, Farrell, and Baskett indicated in 2004, and Brown again in 2018, the cost of a live birth is a key part of financial sustainability for delivery hospitals. This must be considered when evaluating the medicalization of birth and how it is influenced. Allen et al. (2004), Brown (2018), and Zahran et al. (2019) discuss the use of induction and augmentation and the resulting cascade of interventions, increased risk of Cesarean, and increased costs to both patient and health system. Hospital policy, provider time and practice habits influence use of interventions (Zahran et al., 2019).

Brown (2018) had approached the cost influence on birth in terms of policy and litigious events as opposed to a direct financial aspect. The intention of Brown's 2018 article is on the midwifery model and low intervention out of hospital birth, where there is a clear contrast drawn between the high intervention labor and birthing process found

in the majority of American hospital settings. Brown's recommendations are closely aligned with Aubrey-Bassler et al. (2015), Avery et al. (2014), Mayberry et al. (2017) and others noted in this chapter. The obstetrical care spending in America has surpassed $111 billion a year, significantly more than any other industrialized country, and yet we continue to decline in maternal and infant health.

The desire to medicalize birth is costing the US more than dollars. The negative impact on human capital and capacity appears to be driven by the desire to focus more on high tech labor and birth and the increased profits that accompany it (Brown, 2018; Zahran et al., 2019). The US has a national Cesarean rate of roughly 30%, nearly 3 times higher than WHO and HP2020 recommendations. Research into the idea of profit over autonomy and human capital is a fairly new field of research. Payer sources point to birth as one of their largest expenditures as Zahran et al. (2019).

As indicated above, intervention use does lead to higher costs to family and payers, it must be noted that in the case of pregnant individuals who are past dates at 41weeks or greater, the risk cost/risk ratio is flipped. Once a pregnant person reaches 41 weeks or greater the risk of still birth, neonatal and maternal complications, and C-section risk greatly increase (Kaimal et al., 2011). In these situations, the use of induction and augmentation have been found to be cost effective and often less costly than spontaneous labor.

## Summary and Conclusions

Ideally obstetrical care is a cooperative practice, at times requiring multiple disciplines to work in unison with the same patient. In a labor and delivery unit, these

cooperative practices can become strained in an effort to exude territorial control and practice methodology superiority. Each practice specialty (OB/GYN, FMP, midwives, Nurses) has a unique perspective on caring for the patient and how to achieve the best possible outcome (Rime, 2004). However, to achieve our HP2020 indicator goals, the use of evidence-based practices should be upheld.

The use of routine intrapartum interventions has been rooted in the standard delivery of care in most settings and across provider types (Aubrey-Bassler et al., 2015). This ability to provide evidence-based care broadly across provider types and settings could be impacted by the way physician-learners are trained. When FMPs are trained alongside OB/GYNs, there may be carry over of the OB/GYN philosophy of care. As Harris et al. (2012) and Cheng et al. (2014) have indicated, yes, the use of standard care non-evidence-based care is common in such a setting.

Public health in the U. S. includes maternal, infant, and child health. The CDC, ODPHD, ACOG, and AAFP state clearly the need for improvement in this area (AAFP, 2018: ACOG, 2017: CDC, 2016: & ODPHD, 2018). As identified in the existing literature, over the course of 30 years (Rosenblatt et al, 1997, as a landmark study) obstetrical providers have not consistently provided evidence-based care and appear to have become akin to providing care in a routine manor that best suits the provider and not the laboring individual/birthing dyad (Aubrey-Bassler, 2015; Avery, 2014; Carlson et al., 2017; Mayberry et al., 2017).

The intended use of evidence-based intrapartum care, which ACOG (2017) and AAFP (2018) clearly desired, does not appear to be occurring. Through continued

research of the practice methodology, current intrapartum practices in academic settings, and obstetrical outcomes based on provider type, MCH health outcomes may improve. To do better, we must know better. To know better, we must evaluate what we do.

# Chapter 3: Research Method

## Introduction

Medically enhanced labors were intended to be a rare practice, except when the benefits of birth outweighed the risk to the pregnant individual and fetus (Cunningham et al., 2018). However, induction and augmentation are reportedly used in the labor and birthing process up to 55% of the time depending on the setting. This practice has become so common, 1 out of every 4 labor and births will involve induction or augmentation (Cunningham et al., 2018). This does not follow best practices, and often patients are not provided with a full understanding of the risks (Simkin, 2017). Routine, and non-medically indicated induction and augmentation increase maternal and neonate mortality and morbidities (Avery, 2017; Mayberry et al., 2017).

The common place practice of induction and augmentation (Simpson, 2017) carries an increased risk of harm (Chalmers & Dzakpasu, 2015), are higher-technology labor and births, and increase the cost of care (Carlson, Corwin, & Lowe, 2017). Despite the 2017 ACOG practice guidelines on induction and augmentation use, and the adoption of the practices by American Academy of Family Physicians, routine non-medically indicated inductions and augmentations remain standard in many hospitals (MacDorman, Declercq, & Thoma, 2017; Mayberry et al., 2017; Simpkin, 2017; Simpson, 2017; Shields, 2018).

Rosenblatt et al. (1997) provided a seminal framework for understanding how OB/GYN are more likely to use induction and augmentation than FMP and midwives. Mayberry et al. (2017). Mayberry et al. (2017), Simpkin (2017) and others have shown

that providing care in a risk-adverse setting has led to an increased routine use of induction and augmentation, without increasing positive labor and birth outcomes for the birthing dyad. FMP, and midwives, when working in the same settings, have demonstrated similar, if not better, labor and birth outcomes with fewer interventions and less risk (Young, 2017). However, a need of further research comparing OB/GYNs and FMP or/and residents, in academic settings has been stated (Aubrey-Bassler et al, 2015; Carlson, Corwin, & Lowe, 2017; Mayberry et al., 2017; Young, 2017).

Leading public health and maternal and infant health organizations have stated we are failing our moms and babies (AAFP, 2018; ACOG, 2017; CDC, 2016; ODPHD, 2018). Despite the calls for a move towards evidence-based physiological birth among all obstetrical provider types, the use of routine labor induction and augmentation continues (ACOG, 2017; Aubrey-Bassler, 2015; Carlson et al., 2017; Mayberry et al., 2017). The continued call for additional research into labor and delivery practices (Mayberry et al., 2017; Carlson et al., 2017; Grobman et al., 2018), and the subsequent outcomes, has identified a desire to know more so we can do better. ACOG (2017) and AAFP (2018) guidelines are created to ensure positive maternal and infant health outcomes, using best practices and evidence-based decision making.

Nowhere else are evidence-based best practices more important than an academic medical setting. Physician-learners are learning labor and birth methodologies and practices by multiple attending providers in a shared practice setting and building the foundation for their future obstetric practices. This study may hold an opportunity to improve labor and birthing management and practices, to improve the academic learning

environment, and to improve the practice methodologies of new obstetrical care providers.

This chapter covers the following topics: research study design and rationale for its use, quantitative data, sampling and sampling procedures, the use of archival data, threats to validity, ethical considerations, how archival subjects and data are protected, and how the study results could be disseminated.

## Research Design and Rationale

### Variables

In this study, there was one independent variable, and three dependent variables. The independent variable is: provider type. Provider type indicated who the labor and births were managed by an FMP or an OB/GYN provider. The dependent variables are: labor induction, labor augmentation, and outcome. Labor induction includes the various methods commonly used to induce (synthetically start) labor. Labor augmentation includes the various methods commonly used to augment (enhance) labor. Outcome includes the delivery method, maternal complications, neonate complications, and neonate APGAR score.

### Rationale

A retrospective comparative analysis of archival data using DI theory was used in this study. DI is rooted in the way in which it can explain who utilizes or adopts a behavior and why some may not modify behaviors (Glanz, Rimer, & Vinswanath: & LaMorte, 2018). The objective of applying DI to this was to identify an association between provider type and adoption and use of ACOG guidelines and the influence or

odds of that adopting based on their respective practice methodologies and the labor/birthing outcomes for the birthing dyad.

This study is a secondary data analysis of archival quantitative data from an urban academic medical institution. Data from June 1, 2013 to May 31, 2018 was reviewed to garner a large enough sample of FMP and OB/GYN residents and attending physicians and align with current ACOG best practices. Archival quantitative data was chosen based on the desire to compare the practice methodologies used in labor induction and augmentation by provider type, and the related labor and birth outcomes for the birthing dyad.

An analysis of archival data gathered from a chart review was chosen due to the ease of use of secondary or archival data, the limited impact to patients, and the cost effectives of archival data. Archival data use does come with potential risks. The data were collected and documented by a third party, medical record documentation is subjective, and the abstracting of data was conducted by a third party, which significantly limited my control over their dataset. However, a medical record and its contents are generally accepted to be accurate, and data from medical records are considered to be reliable sources (Panacek, 2007).

## Methodology

### Population

The population comprised approximately 56 family medicine and 40 OB/GYN physicians and residents who participated in 9,584 labor and delivery processes over a 5-year period. The archival dataset included all labor and deliveries occurring at an urban

academic medical institution over a 5-year period, June 1, 2013 and May 31, 2018, with a reported 9,584 births. For this study, all admissions and births occurring outside of June 1, 2013 and May 31, 2018, are excluded.

**Sampling and Sampling Procedures**

The sample set chosen from the archival data includes expectant individuals who meet low and low-moderate risk standards for pregnancy, and who were low or low-moderate risk at labor and delivery admission. Of the 9,584 births present in the data base, 5,000 were removed due to exclusion criteria. Excluded populations included those with moderate risk factors (such as preeclampsia, gestational diabetes Type 1, diabetes, Types 1 and 2, epilepsy, multiples) and those who were co-managed by high-risk OB/GYNs or patients of high-risk OB/GYNs. Patients of providers outside of the academic institutions care staff, and midwives were also excluded.

For this study, I used a G*Power program to determine power. (Buchner, Erdfelder, Faul & Georg-Lang, 2019). The approximate sample size of my sample is 4,850. However, I conducted a post-hoc power analysis using G*Power to determine the power of the sample size. The analysis for this study included a binominal logistical regression with: one multinomial logistic regression with five variables, one multinomial logistic regression with four variables, two multinomial logistic regressions with nine variables. The binomial logistic regression and the multinomial logistic regression resulted with odds ratios as the output.

**Archival Data**

This research study used archival data that was collected from medical records of all births occurring during a 5-year period as a part of an internal quality improvement (QI) project. To conduct the QI project, the department head was required to obtain approval and an IRB waiver. The QI project was conducted to assess FMP resident's induction and labor management practices to ensure they are adhering to local standards of care and ACOG guidelines are used. The QI project involved a chart review gathering data from five years of labor and birth charts including the following: patient demographics (including insurance type and gravida), reason for admission, gestational age, cervical measurements, provider type (admission, delivery and discharge), labor induction use/type, labor augmentation use/type, rupture of membranes and type, analgesic use, episiotomy, delivery method, APGAR scores, intrapartum complications, and provider demographics (gender, OB/GYN vs FM, resident vs attending).

I had obtained permission from the family medicine department of the academic delivery institution who created the data base for an internal QI project. The family medicine department head was required to obtain permission from their internal IRB and Quality Assurance department to provide this research to access the data set, to analyze the data, and to publish my research and results based on this archival dataset. A corporative agreement was made through the department of the academic institution which conducted the quality review. My research was the initial analysis of this data.

Archival data while accessible and may have been used in previous internal reviews or research activities, is not without its challenges. There may be gaps and

incomplete information, the researcher has no control or real time validation of the collection methods and creation of the original data base (Rudestam & Newton, 2015). The intended dataset for this study was created out of a QI project conducted within an urban academic teaching institution by an internal researcher with a familiarity with obstetrical terms and procedures.

## Operationalization

*Provider type*: (FMP, OB/GYN) is an independent nominal variable with two values: (0) family medicine (1) OB/GYN,

*Labor induction type*: Labor induction type is a dependent nominal variable with five values: (0) Pitocin, (1) Foley/Cook catheter, (2) Cervidil, (3) Cytotec, (4) none

*Labor augmentation type*: Labor augmentation type is a dependent nominal variable with four values: (0) Pitocin, (1) Foley/Cook catheter, (2) AROM, (3) none

*Outcome*: Outcome is a dependent nominal variable with (0) AGPAR ≥ 7, (1) AGPAR < 7, (2) NICU admission, (3) maternal complication, (4) Complicated vaginal delivery, (5) Complicated operative vaginal delivery, (6) Complicated C-section, (7) C-section, (8) uncomplicated C-section, (0) uncomplicated vaginal delivery). Outcome fields may be analyzed independently.

The following variables were used to describe descriptive statistic.

*Provider status*: Provider status is operationalized as a nominal variable with two possible values: (1) attending, (2) resident.

*Provider gender*: Provider gender operationalized as a nominal variable with two possible values: (0) male, (1) female.

## Definition of Terms

*AROM*: Artificial Rupture of Membranes (bag of waters), this can be performed to enhance labor (Cunningham et.al., 2018).

*SROM*: Spontaneous Rupture of Membranes (bag of waters), this can occur during or right before labor. If this occurs before labor has begun it may be referred to PROM, Premature Rupture of Membranes) (Cunningham et.al., 2018).

*Maternal Complication*: A physical or mental health complication of pregnancy, labor, birth, or the postnatal period (up to one year after birth) (Cunningham et.al., 2018).

*Pitocin*: A medication given to induce or augment labor, can also be given immediately after birth to prevent or treat a postpartum hemorrhage (Cunningham et.al., 2018).

*Cervidil*: A medication inserted into the vagina to ripen the cervix, with the intention of starting labor (Cunningham et.al., 2018).

*Cytotec*: A medication taken orally or inserted into the vagina or anus to induce labor. Can also be used immediately postpartum to prevent or treat a postpartum hemorrhage (Cunningham et.al., 2018).

*Foley/Cook catheter*: A urinary catheter that is sometimes used to start or enhance cervical dilation, which can induce or augment a labor (Cunningham et.al., 2018).

## Data Analysis Plan

In this study I used both descriptive and inferential statistical analysis. IBM's SPSS software (version 24) was used to analyze the data. Data analysis included

descriptive statistics including the following: age, insurance status, and marital status. For the purpose of this study family medicine, uncomplicated vaginal delivery, and an APGAR ≥7 are considered the baseline for a positive outcome.

To determine statistical significance, an alpha level of $\alpha = .05$ and a CI = 95%, and to reject the null hypothesis based on the following definitions:

- Rejection of the null hypothesis when a *p*-value is less than or equal to the alpha level.
- Rejection of the alternative hypothesis when a *p*-value is greater than alpha level.

## Research Questions

1. Is there a significant association between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies?

   *H1* A significant association exists between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies.

   $H_{01}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies. The variables for this research question are nominal, a binominal logistic regression was performed to provide an odds ratio.
2. Is there a significant association between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies?

*H2* A significant association exists between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies.

$H_{02}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies?

The variables for this research question are nominal, a multinomial logistic regression was performed to provide an odds ratio.

3. Is there a significant association between provider type (family medicine and OB/GYN) and augmentation in healthy pregnancies?

   *H3* A significant association exists between provider type (family medicine physicians or OB/GYNs) augmentation in healthy pregnancies.

   $H_{03}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and augmentation in healthy pregnancies?

   The variables for this research question are nominal, a multinomial logistic regression was performed to provide an odds ratio.

4. Is there a significant association between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies?

   *H4* A significant association exists between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

   $H_{04}$ No significant association exists between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

   The variables for this research question are nominal, a multinomial logistic regression was performed to provide an odds ratio.

5. Is there a significant association between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies?

   *H5* A significant association exists between augmentation and labor delivery outcomes for the birthing dyad in healthy pregnancies.

   $H_{05}$ No significant association exists between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

   The variables for this research question are nominal, a multinomial logistic regression was performed to provide an odds ratio.

## Threats to Validity

Threats to validity for my archival non-experimental research study are rooted in the integrity of extraction of data from medical records and the process in which the resulting data base was created. Methods of extraction are considered to be imprecise, which can result in potential errors at each step (Panacek, 2007). However, medical records themselves are believed to be an accurate record of events and measurements and are often sought by third-party entities such as insurance companies and considered as factual and accurate sources of information (Panacek, 2007). Additional threats may include missing data from the medical record, and abstractor error.

Strategies taken to ensure the validity of the data included: original chart extraction and data base was created by an internal academic researcher familiar with obstetric terminology, clear inclusion and exclusion criteria, original data base was developed within the RedCap system of the academic medical institution, and internal review of the data base development protocols. RedCap was developed by Vanderbilt

University and is a secure web-based application used for developing and managing online/electronic surveys and databases that is HIPAA compliant. RedCap allows for a seamless data translation for common quantitative and qualitative data analysis software systems. RedCap is used by many large academic medical institutions (Vanderbilt University, n.d.)

## Ethical Procedures

I used secondary archival data from an urban academic institution which was gathered through a quality improvement chart review project. Due to the existing data set, no original data was collected, therefore there no informed consent required. The academic institution that conducted the QI project was required to obtain an IRB waiver and to meet the required institutional standards for QI projects. The academic institution required a copy of my IRB approval and a data use agreement before I was provided with the data set. HIPAA and institutional polices were followed during the quality improvement project. No attempts were made to obtain any identifying data during the course of this study.

With the use of archival data, there were no recruitment efforts. Data contained within the dataset are de-identified. The dataset was be treated with respect, is unaltered, and is be safely stored on my personal computer with double encryption. The dataset provided to me will be stored on my computer and will be stored for no more than 5 years. The original dataset is available to faculty members and researchers at the urban academic institution upon request. I have no conflicts of interest to disclose regarding this research study.

## Summary

Chapter 3 contains the research design and methodologies for this archival data study. The data obtained and analyzed in this study may provide a snapshot of the labor induction and augmentation practices and their effects on labor and birthing outcomes for the birthing dyad at an urban academic teaching institution. Additionally, this chapter contains the design and sampling methods of this study, data analysis and software used to conduct the analysis. Ethical considerations and threats to validity were also included. The following chapter, Chapter 4, contains my discussion of the data analysis.

# Chapter 4: Results

## Introduction

The purpose of this study was to examine the associations between the medical provider type and interventions and outcomes for the laboring individual and the neonate. For RQs 1-3, the independent variable was medical provider type and the dependent variables were delivery outcome (maternal and neonate), labor induction, and labor augmentation respectively. For RQs 4 and 5, the dependent variables were delivery outcome (maternal and neonate), and labor induction and augmentation were the independent variables respectively.

This chapter covers the data collection, results, and summary. In data collection I review how the data for this study were collected, provide an explanation of the sample demographics, and discuss changes made to the analysis plan from Chapter 3.

## Data Collection

The dataset used in this was obtained from an academic medical center in a midwestern state who provides residency options for (FMPs), (OB/GYNs), women's health nurse practitioners (WHNP), and certified nurse midwives (CNM). However, at the time of this study, WHNPs and CNMs were provided admitting and laboring privileges only, not delivering privileges. Therefore, they were included in as prenatal care provider types. However, the only admissions included in this study are those that resulted in a labor and delivery from FMPs and OB/GYNs that took place between June 1, 2013- May 31, 2018, were low-risk/healthy pregnancies and were delivered by FMPs and OB/GYNs. The IRB approval number for this study is 07-29-20-0348975.

This is a study of archival data obtained from a family medicine QI project at an academic medical institution conducted from labor and deliveries between June 1, 2013 to May 31, 2018. The original dataset consisted of 9,584 labor/deliveries; however, I was provided with a dataset of 2,542 deliveries of healthy pregnancies up to and at the time of admission. Out of the 9,854 deliveries that took place during the study time frame 7,339 had one more indication of maternal or fetal risk including but not limited to chronic disease, gestational complication, and fetal complications. Participants with significant amounts of missing data or missing APGAR scores and/or birth outcome (live birth, IUFD, stillbirth) were removed, a total of 27 cases. The remaining 2,515 deliveries included in this study are low risk pregnancy/healthy pregnancies with no known chronic disease, co-morbidity, or complication.

The participant demographics include prenatal care provider, age, gravidity, EGA at admission, primary language spoken, marital status, and insurance status. Most study participants received prenatal care from OB/GYNs 87%, spoke English 68%, were married 55%, and had private health insurance 46% at the time of delivery, and labor occurred during the "term" period of 39-40.6 weeks 69.9%. The primary delivery method was Spontaneous Vaginal Delivery (SVD) 88.3%, Cesarean at 6.8%, and Operative Vaginal Delivery (OVD) at 4.6% (forceps and/or vacuum used during a vaginal delivery). Table 1 provides the study participant demographic information.

**Table 1**

*Frequencies and Percentages for Sample Demographics*

| Variable | N | % |
|---|---|---|
| Prenatal Care Provider | | |
| None | 2 | 0.1 |
| Family Med | 309 | 12.3 |
| OB/GYN | 2202 | 87.6 |
| Missing | 2 | 0.1 |
| Age Range | | |
| ≤17 | 75 | 3.0 |
| 18-24 | 728 | 28.9 |
| 25-29 | 800 | 31.8 |
| 30-34 | 680 | 27.0 |
| 35-39 | 197 | 7.8 |
| 40≤ | 31 | 1.2 |
| Missing | 4 | 0.2 |
| Marital Status | | |
| Married | 1389 | 55.2 |
| Cohabitating | 20 | 0.08 |
| Single | 1077 | 42.8 |
| Missing | 29 | 1.2 |
| Primary Language | | |
| English | 1710 | 68.0 |
| Spanish | 606 | 24.1 |
| Other | 161 | 6.4 |
| Missing | 38 | 1.5 |
| Insurance Type | | |
| No Insurance | 751 | 29.9 |
| Medicaid/Medicare | 590 | 23.5 |
| Private Insurance | 1170 | 46.5 |
| Missing | 4 | 0.2 |
| Gravidity | | |
| 1 | 868 | 34.5 |
| 2 | 706 | 28.1 |
| 3 | 484 | 19.2 |
| 4 | 259 | 10.3 |
| 5 | 107 | 4.3 |
| 6 | 49 | 1.9 |
| 7+ | 41 | 1.6 |
| Missing | 1 | 0.0 |

| Variable | N | % |
|---|---|---|
| EGA at Admit | | |
| Preterm ≤36.6 | 5 | 0.0 |
| Early Term 36.6-38.6 | 511 | 4.3 |
| Term 39-40.6 | 1757 | 1.9 |
| Post-term 41≥ | 239 | 1.6 |
| Missing | 3 | 0.1 |
| Spontaneous Vaginal Delivery (SVD) | | |
| No | 293 | 11.7 |
| Yes | 2222 | 88.3 |
| Cesarean | | |
| No | 2343 | 93.2 |
| Yes | 172 | 6.8 |
| Operative Vaginal Delivery (OVD) | | |
| No | 2399 | 9534 |
| Yes | 116 | 4.6 |
| | | |
| Total | 2515 | 100 |

# Results

## Descriptive Statistics for Main Study

The study data represents the 2515 low risk/healthy pregnancies up to admission for labor and delivery during the study period. A post-hoc G*Power analysis on G*Power Version 3.1.7 was used to determine the power of the sample size. For the G*Power analysis I chose the Exact- Linear multiple regression: Random model with exact distribution. At 2515 participants, an error of probability at $\alpha=0.05$ and 5 predictors, the power was determined to be Power (1-β err prob) 1.000. Indicating that with 2515 participants my analysis would have a 100% confidence level.

A secondary analysis was conducted on the provider status with RQ 1 2, & 3 to determine the effect of provider status, attending versus resident, on the dependent variable. A second Post-hoc G*Power analysis was conducted to determine the power of the status sample size, 92 and 2313 respectively. With the smaller sample of 92, attending managed labors, an error of probability at $\alpha=0.05$ and 3 predictors, the power was determined to be Power (1-β err prob) 0.999. Indicating that with 92 participants, or 92 attending managed labors, my analyses would have a 99% confidence level.

In this analysis, Admit Provider is defined as defined as the Provider Type with 0 assigned to OB/GYN, 1 assigned to FMP, and 9 assigned to missing. Admit Provider Status is defined with 0 assigned to Attending, 1 assigned to Resident, and 9 assigned to missing.

Of the 2515 deliveries 1973 were under the care of OB/GYNs and 523 by FMPs, with 2413 managed by residents and 92 solely managed by attendings. Labor induction occurred in 37% of labor and deliveries, and 66% were determined to require augmentation to facilitate delivery. Poor labor and delivery outcomes for the laboring individual and/or neonate occurred in 1,798 deliveries (71.5%).

**Table 2**

*Frequencies and Percentages of Variables*

| Variable | N | % |
|---|---|---|
| Admit Provider | | |
| OB/GYN (0) | 1973 | 78.4 |
| Family medicine (1) | 523 | 20.8 |
| Missing (9) | 19 | 0.8 |
| Admit Provider Status | | |
| Attending (0) | 92 | 3.7 |
| Resident (1) | 2413 | 95.9 |
| Missing (9) | 10 | 0.4 |
| Induction Y/N | | |
| No (0) | 1585 | 63.0 |
| Yes (1) | 930 | 37.0 |
| Augmentation Y/N | | |
| No (0) | 565 | 22.5 |
| Yes (1) | 1850 | 73.6 |
| Missing (9) | 100 | 4.0 |
| Maternal Labor Complication (MLC) Y/N | | |
| No (0) | 1691 | 67.2 |
| Yes (1) | 824 | 32.8 |
| Delivery Complications | | |
| No (0) | 1509 | 60.0 |
| Yes (1) | 974 | 38.7 |
| Missing (9) | 32 | 1.3 |
| Labor/Birth Outcome M&B | | |
| Bad (0) | 1798 | 71.5 |
| Good (1) | 711 | 28.3 |
| Missing (9) | 6 | 0.2 |
| Total | 2515 | 100 |

The data analysis plan presented in chapter 3 was written prior to obtaining the data set. After reviewing the dataset a decision was made to alter the type of analysis on RQ's 2-5 from multinomial logistic regression to binomial logistic regression due to the way the data was captured in the RedCap form. The variables for induction, augmentation, and all outcome variables were coded as dichotomous. Outliers and missing information were reviewed and replaced with a dummy variable of '9' to allow for frequencies purposes and removed to facilitate binomial regression analysis.

To determine 'goodness of fit' both the Omnibus Tests of Model Coefficients and Hosmer and Lemeshow tests were used. The Omnibus test determines goodness of fit when $p <. 05$, and the Hosmer Lemeshow test determines goodness of fit when $p > .05$ (Pallant, 2020). A determination of a correctly specified model was made with either a significant Omnibus test ($p < .05$) or a unsignificant Hosmer and Lemeshow ($p > .05$).

**Research Questions and Hypothesis**

To address each of the research questions, binomial logistic regression was conducted to assess for an association between each provider type and status and intervention use (induction and augmentation) and labor and delivery outcomes. In RQ 1-3 the dependent variable was the labor and delivery outcome. For RQ2 the dependent variable is labor induction, and in RQ3 the depended variable is labor augmentation. The independent variable in RQs 1-3 is provider type. In RQ4 the independent variable is induction, and the dependent variable is labor/delivery outcome, and in RQ5 the independent variable is augmentation, and the dependent variable is labor/delivery

outcome. RQ1. Is there a significant association between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies?

*H1*A significant association exists between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies.

$H_{01}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies.

**Table 3**

*Omnibus Tests of Model Coefficient*

| | | Chi-Square | df | Sig. |
|---|---|---|---|---|
| Step 1 | Step | 2.150 | 2 | .341 |
| | Block | 2.150 | 2 | .341 |
| | Model | 2.150 | 2 | .341 |

**Table 4**

*Hosmer and Lemeshow Test*

| Step | Chi-Square | df | Sig |
|---|---|---|---|
| 1 | .002 | 1 | .968 |

A binomial logistic regression analysis was conducted to explore the association between provider type and labor and delivery outcomes in healthy pregnancies. The outcome of interest was good outcome, and the predictor of interest was provider type-family medicine Physician. The Omnibus test, Table 3, was not significant ($p>.05$), and the Hosmer and Lemeshow was also not significant ($p>.05$). The Hosmer and Lemeshow test, Table 4, indicated the model is correctly specified. Additionally, the –2 Likelihood=

2960.183 and the Nagelkerke R squared = .001. The independent variable of provider type was not significant ($p$>0.05). The predictor variable provider type-family medicine in the logistic regression analysis did not contribute to the model.

A secondary analysis was conducted to explore the association between provider status and labor and delivery outcomes in healthy pregnancies. The outcome of interest was good outcome, and the predictor of interest was provider status, resident. The Omnibus test was not significant ($p$>.05), and the Hosmer and Lemeshow was also not significant ($p$>.05). The Hosmer and Lemeshow test indicated the model is correctly specified. The independent variable of provider status was not significant ($p$>05). The predictor variable provider status- resident in the logistic regression analysis did not contribute to the model.

The results of the Omnibus Tests of Model Coefficients, Hosmer and Lemeshow Test, model summary, and the binary logistic regression can be found in Tables 3, 4, 5, and 6 respectively.

**Table 5**

*Model Summary*

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkreke R Square |
|---|---|---|---|
| 1 | 2960.183[a] | .001 | .001 |

[a] Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

**Table 6**

*RQ1 Provider Type and Status and Labor/Birth Outcome*

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for Exp(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| Step 1[a] | Admit_provider (1) | -.079 | .111 | .515 | 1 | .473 | .924 | .744 | 1.147 |
| | Admit provider status (1) | -.335 | .259 | 1.679 | 1 | .195 | 1.398 | .842 | 2.322 |
| | Constant | -1.236 | .254 | 23.673 | 1 | .000 | .291 | | |

[a] Variable(s) entered on step 1: Admit_provider, Admit Provider Status.

The associations are not statistically significant, suggesting there is no correlation between the provider type and the labor and delivery outcome. The association is not significant; therefore, the null hypothesis for research question 1 $H_{02}$ could not be rejected, indicating that no significant association exists between provider type and labor and delivery outcomes.

RQ2. Is there a significant association between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies?

*H2* A significant association exists between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies.

*$H_{02}$* No significant association exists between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies.

**Table 7**

*Omnibus Tests of Model Coefficients*

| | | Chi-Square | df | Sig. |
|---|---|---|---|---|
| Step 1 | Step | 21.699 | 2 | .000 |
| | Block | 21.699 | 2 | .000 |
| | Model | 21.699 | 2 | .000 |

**Table 8**

*Hosmer and Lemeshow Test*

| Step | Chi-Square | df | Sig |
|---|---|---|---|
| 1 | 1.406 | 1 | .236 |

A binomial logistic regression analysis was conducted to explore the association between provider type and labor induction. The outcome of interest was labor induction and the predictors of interest were, for provider type- family medicine Physician. The Omnibus test was significant ($p$<.05), and the Hosmer and Lemeshow was not significant ($p$>.05). The Omnibus and Hosmer and Lemeshow tests indicated the model is correctly specified. Additionally, the –2 Likelihood=3261.569 and the Nagelkerke R squared = .012. The independent variable of provider type was found to be significant ($p$<.05). The predictor variable is provider type-family medicine and the dependent variable is labor indication. In the logistic regression analysis, the predictor variable, provider type, did contribute to the model. The unstandardized B=-4.63, -.262 SE=.107, .218 Wald= 18.560, 1.437, $p$<.05 & $p$>.05. The estimated odds ratio favored a decrease risk of induction of nearly 38% [Exp(B)=.629, 95%CI (.510, .777) for everyone under family medicine labor management. Indicating FMPs are more likely to allow labor to begin on

its own, following a psychological model of labor management and aligned with current evidence-based best practices.

A secondary analysis was conducted to explore the association between provider status and labor induction. The outcome of interest was labor induction-no (*N*), and the predictor of interest was provider status, resident. The Omnibus test was significant ($p$ <.05), and the Hosmer and Lemeshow was not significant ($p > .05$). The Omnibus and Hosmer and Lemeshow test indicated the model is correctly specified. The independent variable of provider status was not significant ($p > .05$). The predictor variable provider status- resident in the logistic regression analysis did not contribute to the model.

The results of the Omnibus Tests of Model Coefficients, Hosmer and Lemeshow Test, model summary, and the binary logistic regression can be found in Tables 7, 8, 9 and 10 respectively.

**Table 9**

*Model Summary*

| **Step** | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 3261.569[a] | .009 | .012 |

[a] Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

**Table 10**

*RQ2 Provider Type, Provider Status, and Labor Induction*

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for Exp(B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| Step 1[a] | Admit_provider (1) | -.463 | .107 | 18.560 | 1 | .000 | .629 | .510 | .777 |
| | Admit provider status 1) | -.262 | .218 | 1.437 | 1 | .231 | .770 | .502 | 1.181 |
| | Constant | -.188 | .213 | .776 | 1 | .378 | .829 | | |

[a] Variable(s) entered on step 1: Admit_provider, Admit Provider Status.

The association between provider type and labor induction was significant. However, there was no significant association between provider status and labor induction. The association was positive; therefore, the null hypothesis for research question 3 $H_{02}$ was partially rejected, indicating that a significant association exists between provider type (OB/GYN and FMP) and labor induction in healthy pregnancies, with a decrease of 38% in induction risk when labor is managed by an FMP

RQ3 Is there a significant association between provider type (family medicine and OB/GYN) and augmentation in healthy pregnancies?

*H3* A significant association exists between provider type (family medicine physicians or OB/GYNs) and augmentation in healthy pregnancies.

$H_{03}$ No significant association exists between provider type (family medicine physicians or OB/GYNs) and augmentation in healthy pregnancies.

**Table 11**

*Omnibus Tests of Model Coefficients*

| | | Chi-Square | df | Sig. |
|---|---|---|---|---|
| Step 1 | Step | 7.185 | 2 | .028 |
| | Block | 7.185 | 2 | .028 |
| | Model | 7.185 | 2 | .028 |

**Table 12**

*Hosmer and Lemeshow Test*

| Step | Chi-Square | df | Sig |
|---|---|---|---|
| 1 | .000 | 0 | .000 |

A binomial logistic regression analysis was conducted to explore the association between provider type and labor augmentation. The outcome of interest was labor augmentation-no (N), and the predictor of interest was, for provider type- family medicine Physician. The Omnibus test was significant ($p$<.05), and the Hosmer and Lemeshow was significant ($p$<.05). The Omnibus test indicates the model is correctly specified. Additionally, the –2 Likelihood= 2599.168 and the Nagelkerke R squared = .005. The independent variable of provider type was found to be significant ($p$<.05). The predictor variable for provider type-family medicine, in the logistic regression analysis did contribute to the model. The unstandardized *B= -.244, -4.23*, SE= .115, .297, Wald= 4.514, 2.028, $p$<.05 and $p$>.05. The estimated odds ratio favored a decrease of nearly 22% risk of augmentation [Exp (B)= .78, 95%CI (.625, .981) with family medicine labor management.

A secondary analysis was conducted to explore the association between provider status and labor augmentation. The outcome of interest was labor Augmentation-no (N), and the predictor of interest was provider status, resident. The Omnibus test was significant ($p<.05$), and the Hosmer and Lemeshow was not significant ($p>.05$). The Omnibus and Hosmer and Lemeshow test indicated the model is correctly specified. The independent variable of provider status was not significant ($p>.05$). The predictor variable provider status- resident in the logistic regression analysis did not contribute to the model.

The results of the Omnibus Tests of Model Coefficients, Hosmer and Lemeshow Test, model summary, and the binary logistic regression can be found in Tables 11, 12, 13 and 14 respectively.

**Table 13**

*Model Summary*

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkreke R Square |
|---|---|---|---|
| 1 | 2599.168[a] | .003 | .005 |

[a] Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

**Table 14**

*RQ3 Provider Type, Provider Status, and Labor Augmentation*

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for Exp(B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| Step 1[a] | Admit_provider (1) | -.244 | .115 | 4.514 | 1 | .034 | .783 | .625 | .981 |
| | Admit provider status (1) | -.423 | .297 | 2.028 | 1 | .154 | .655 | .366 | 1.173 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Constant | 1.647 | .292 | 31.769 | 1 | .000 | .5.190 |

[a] Variable(s) entered on step 1: Admit_provider, Admit Provider Status.

The association between the variables of provider type and labor augmentation was significant. However, there was no significant association between provider status and labor augmentation. The association between provider type and augmentation was positive; therefore, the null hypothesis for research question 3 $H_{02}$ was partially rejected, indicating that a significant association exists between provider type and labor augmentation in healthy pregnancies. A decrease in risk of labor augmentation by 22% was found with FMP managed labors.

RQ4: Is there a significant association between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies?

*H4* A significant association exists between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

$H_{04}$ No significant association exists between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

**Table 15**

*Omnibus Tests of Model Coefficients*

| | | Chi-Square | df | Sig. |
|---|---|---|---|---|
| Step 1 | Step | 17.755 | 1 | .000 |
| | Block | 17.755 | 1 | .000 |
| | Model | 17.755 | 1 | .000 |

**Table 16**

*Hosmer and Lemeshow Test*

| Step | Chi-Square | df | Sig |
|---|---|---|---|
| 1 | .000 | 0 | .000 |

A binomial logistic regression analysis was conducted to explore the association between labor induction and labor and delivery outcomes in healthy pregnancies. The outcome of interest was good outcome, and the predictor of interest was, labor induction. The Omnibus test was significant ($p < .05$), and the Hosmer and Lemeshow was also significant ($p < .05$). The Omnibus test indicates the model is correctly specified. Additionally, the –2 Likelihood= 2973.561 and the Nagelkerke R squared = .010. The independent variable labor induction was found to be significant ($p > 0.05$). Controlling for labor/birth outcome, predictor variable labor induction in the logistic regression analysis did contribute to the model. The unstandardized *B*= -.394, SE= .095, Wald= 17.348, $p<.05$. The estimated odds ratio favored a decrease of nearly 33% [Exp (B)=.674, 95%CI (.560, .812) in good outcomes with labor induction.

The results of the Omnibus Tests of Model Coefficient, Hosmer and Lemeshow Test, model summary, and the binary logistic regression can be found in Tables 15, 16, 17 and 18, respectively.

**Table 17**

*Model Summary*

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkreke R Square |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | 2973.561[a] | .007 | .010 |

[a] Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

**Table 18**

*RQ4 Provider Type, Provider Status, and Labor Augmentation*

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for Exp(B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| Step 1[a] | Induction Y/N (1) | -.394 | .095 | 17.348 | 1 | .000 | .674 | .560 | .812 |
| | Constant | -.790 | .054 | 211.481 | 1 | 0.00 | .454 | | |

[a] Variable(s) entered on step 1: Induction Y/N.

The association between labor induction and labor/birth outcome was significant; therefore, the null hypothesis for research question 4 $H_{02}$ was rejected, indicating that a significant association exists between labor induction and labor/birth outcomes in health pregnancies. Labor induction was found to decrease the likelihood of a good labor and birth outcome by 33%.

RQ5 Is there a significant association between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies?

*H5* A significant association exists between augmentation and labor delivery outcomes for the birthing dyad in healthy pregnancies.

$H_{05}$ No significant association exists between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies.

**Table 19**

*Omnibus Tests of Model Coefficients*

| | | Chi-Square | df | Sig. |
|---|---|---|---|---|
| Step 1 | Step | 2.193 | 1 | .139 |
| | Block | 2.193 | 1 | .139 |
| | Model | 2.193 | 1 | .139 |

**Table 20**

*Hosmer and Lemeshow Test*

| Step | Chi-Square | df | Sig |
|---|---|---|---|
| 1 | .000 | 0 | .000 |

A binomial logistic regression analysis was conducted to explore the association between labor augmentation and labor and delivery outcomes in healthy pregnancies. The outcome of interest was good outcome, and the predictor of interest was, labor augmentation. T The Omnibus test was not significant ($p > .05$), and the Hosmer and Lemeshow was significant ($p < .05$). The Omnibus and Hosmer and Lemeshow tests indicates the model is not correctly specified. Additionally, the –2 Likelihood= 2897.012 and the Nagelkerke R squared = .001. The independent variable labor augmentation was found to be not significant ($p>0.05$). The predictor variable was labor augmentation, and the dependent variable was labor and birth outcome. In the logistic regression analysis, the predictor variable did not contribute to the model.

The was no significant association between the labor augmentation and labor/birth outcome. The association is not significant; therefore, the null hypothesis for research

question 5 $H_0$ could not be rejected, indicating that no significant association exists between labor augmentation and labor/birth outcomes in healthy pregnancies.

The results of the Omnibus Tests of Model Coefficient, Hosmer and Lemeshow Test, model summary, and the binary logistic regression can be found in Tables 19, 20, 21 and 22 respectively.

**Table 21**

*Model Summary*

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 2897.012[a] | .001 | .001 |

[a] Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

**Table 22**

*RQ5 Labor Augmentation and Labor/Birth Outcome*

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for Exp(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| Step 1[a] | Augmentation Y/N (1) | .155 | .104 | 2.215 | 1 | .137 | 1.168 | .952 | 1.433 |
| | Constant | -.940 | .052 | 329.992 | 1 | 0.00 | .391 | | |

[a] Variable(s) entered on step 1: Augmentation Y/N.

## Summary

The study was conducted to examine the associations between provider type (OB/GYN and FMP) and labor and delivery outcome, provider type and intervention use

(labor induction and augmentation), and intervention use (labor induction and augmentation) and labor and delivery outcome in healthy pregnancies (low risk). The study sample was taken from an urban academic medical center. A sub-analysis was conducted on RQs 1,2, and 3 to examine an association between provider status (attending and resident) and labor and delivery outcome and intervention (labor induction and augmentation) use.

The results of the analysis did indicate there is a significant association between provider type, specifically FMP and a decrease risk of induction and augmentation use, but no significant association between provider type and labor and delivery outcome. A significant outcome was determined between labor and induction and labor and delivery outcome, a decrease risk of a good outcome with the use of labor induction.

# Chapter 5: Discussion, Conclusion, and Recommendations

## Introduction

This study was conducted to determine if providers, OB/GYNs and FMPs in an urban academic medical setting, were practicing in a manner that aligned with their practice methodologies by assessing for association between provider type and intervention (use and labor and delivery outcomes for low-risk healthy pregnancies. Through issue briefs and opinion statements, ACOG indicated that a labor with little intervention often results in a positive outcome (2017). This study sought to identify which provider type, OB/GYNs and FMPs, are practicing low-intervention labor and deliveries (using labor induction and augmentation less frequently), and the impact on the labor and delivery outcomes for healthy (low-risk) pregnancies.

A secondary analysis of RQs 1, 2, and 3 was conducted to examine whether physician-learners (OB/GYN and FMP residents) in an urban academic medical setting were practicing in a manner that aligned with their practice methodologies by assessing for association between provider type and intervention (induction and augmentation) use and labor and delivery outcomes for low-risk healthy pregnancies. In the study sample, 2413 labors were managed by residents, 92 labors were managed by attendings, and 10 were missing physician status. A subanalysis of RQs 1, 2, and 3 determined that resident status did not impact the outcome of labor and delivery. However, RQ2 and RQ3 did find a decrease in odds (38% and 22% respectively) in use of labor induction and labor augmentation.

A retrospective quantitative research method with a theoretical framework of Diffusion of Innovations (DI) was used. A sample of 2,515 low-risk/healthy pregnancies—up to admission for labor and delivery—from an archival quality project were assessed. The research questions were analyzed using binomial logistic regression to determine statistical significance between variables. The analysis indicated a significant association between provider type and intervention use, with this significant finding: the odds of OB/GYNs using labor interventions were greater than the odds of FMPs using interventions. There was also a significant association between induction and labor and delivery outcome, thus indicating a decrease in good labor and delivery outcomes with the use of labor induction.

Chapter 5 covers of an interpretation of the findings, a reflection on the findings and their alignment with current literature, the study limitations, the recommendations for future research, and how this body of work may result in a positive social or systems change.

## Interpretation of Findings

The analysis of the data indicated a significant association between provider type and intervention (labor induction and augmentation), and between labor induction and labor and delivery outcome. Provider type and augmentation and delivery outcome were not significantly associated. The null hypothesis for Research Questions 1 and 5 ($H_01$ and $H_05$) failed to be rejected. Research Questions 2, 3 and 4 ($H_02$, $H_03$, and $H_04$) were partially rejected in favor of the alterative. The findings of the study indicated a statistically significant association between three independent variables, and no

association between two of the independent variables. These outcomes do not include the postpartum physician and mental experiences of the birthing dyad. A table of the research questions and their status are found in Table 23.

**Table 23**

*Research Question and Hypothesis*

| Research Question | Variable | Null Hypothesis |
|---|---|---|
| RQ1 | Provider Type vs. Outcome | Failed to reject |
| RQ2 | Provider Type vs. Induction | Partially Rejected |
| RQ3 | Provider Type vs. Augmentation | Partially Rejected |
| RQ4 | Induction vs. Outcome | Rejected |
| RQ5 | Augmentation vs. Outcome | Failed to reject |

**Research Question 1**

***No association between provider type and birth outcome***

Research Question 1, whether there was a significant association between provider type (family medicine physicians or OB/GYNs) and labor and delivery outcome in healthy pregnancies was answered with the lack of a significant association between provider type and labor and delivery outcome. With a *P* value of > .05, p =.453, the logistic regression results indicated there is no association between provider type and labor and delivery outcome. Indicating a labor and delivery is no less risky with an FMP than with an OB/GYN.

***No increased risk of poor outcome with resident versus an attending physician***

A subanalysis of RQ1 was conducted to determine if an association existed between provider status and labor and delivery outcome. A significant association was not determined. With a *P* value > .05, p = .195, there is not significant association. The results of the sub analysis indicate there is not an increase risk in a poor labor or delivery outcome with a resident versus an attending physician (OB/GYN or FMP).

***Discussion***

These results support the landmark study by Rosenblatt et al. (1997) indicating the safety and efficacy of FMP obstetrical and labor and delivery care and upholds the results of more studies such as AAFP's 2018 Practice Recommendation, ACOG's 2011 Call to Action, and the National Academies of Sciences, Engineering, and Medicine (NASEM) 2020 report on Birth Settings in America. However, it is important to note the overarching belief of OB/GYNs that FMPs should not be practicing obstetrical care or provide labor and delivery care (Avery et al., 2014; Eaton 2014) is not supported by these study findings. In addition, Avery et al. (2014) stated that whether low-risk or high-risk pregnancies, FMPs tend to practice with less cesarean sections and the risk of a poor maternal and infant outcome remains relatively low.

The previous research comparing provider type (FMPs & OB/GYNs) and labor and delivery outcome had been conducted in several settings including a Midwest academic setting (Carlson, Corwin & Lowe, 2017) with comparable sample size. Wiegers (2003) conducted a meta-analysis of 102 studies across North America (including Canada), Europe, and Australia and New Zealand and found that FMPs (General

Practitioners outside of North American) also saw improved or equal outcomes to OB/GYN-managed labors.

Like the Wiegers (2003) study, Aubrey-Bassler et al. (2015) study of maternal and neonatal data for all of Canada, except Quebec, is also large and not comparable in terms of sample size. However, Wiegers and Aubrey-Bassler et al. (2015) both investigated the outcomes of FMP managed pregnancies, labors and deliveries and outcomes compared to OB/GYNs. Both found that FMPs provided equal if not better care with equal if not better outcomes than OB/GYNs. Aubry-Bassler et al. (2015) and Wiegers (2003) studies were conducted in or included Canada and other nations that provide a different style of healthcare system and may have an unintended impact on pregnancy outcome that cannot be controlled for in the United States.

***Regional differences***

Regional differences in the number of FMPs practicing full obstetrics with labor and delivery may play a role in the limited research available. Kozhumamil & Fontaine (2013) highlighted the regional differences with more FMP obstetrical practices and residency programs on the coasts, particularly the northeast, and the limited number of facilities which provide labor and delivery privileges to FMPs.

Rosenblatt et al. (1997) is often cited as a landmark study in FMP and obstetrics research. The study did take place over 20 years ago with study data from 1988, labor and delivery practices and recommendations for both FMPs and OB/GYNs have evolved over time. Despite the age of the study, the findings are comparable to today's studies and the findings of this dissertation. Rosenblatt et al. found that FMPs and OB/GYNs from urban

areas of Washington state, including academic centers, have similar outcomes as OB/GYNs when providing labor and delivery management in low-risk pregnancies.

### *Resident Managed Deliveries*

Of note, Zahran et al., (2019) conducted a study at delivery medical centers, including academic, across Texas and found that there was an increased risk of a poor outcome with a year 1 Resident in the month of July (when year 1 residency begins), at a rate of 2 to 1 than those at non-teaching hospitals. This dissertation study dataset did not indicate the program year for residents, which could be behind the finding of no significance when assessing a relationship between provider status and labor and birth outcome.

## Research Question 2

Research Question 2, whether there was a significant association between provider type (family medicine physicians or OB/GYNs) and labor induction in healthy pregnancies was answered with the presence of a significant association between provider type and use of labor induction. With a *P* value of < .05, p =.000, the logistic regression results indicated there is an association between provider type and labor induction. Indicating labor induction with an FMP is 38% less likely to occur than with an OB/GYN.

A subanalysis of RQ2 was conducted to determine if an association existed between provider status and labor induction. A significant association was not determined. With a *P* value > .05, p = .231, there is not a significant association. The

results of the sub analysis indicate there is not an increased risk of a labor induction with a resident versus an attending physician (OB/GYN or FMP).

The results of the analysis of RQ2 upholds current literature and upholds AAFP 2018, ACOG 2017 recommendations indicating that the overuse of interventions may lead to poor health outcomes and a low technology/low intervention labor and birth management is preferred. Aubrey-Bassler et al. (2015) Balyakina (2016) & Mac Dorman et al. (2014) indicated that FMPs practice methodology aligns with a physiological approach to the birth process including lower rates of labor induction. Kaimal et al. (2011) identified that induction after 41 weeks of labor (post-term) is cost effective and lowers obesity risk. Induction at term is beneficial in reducing hypertension related complications and reducing cesarean birth but does increase the time a pregnant individual spends in labor and delivery (Souter et al., 2019).

However, as Souter et al. stated (2019), the use of the information provided in their study and others, such as this dissertation, can be challenging to appropriately apply as labor and delivery events are unique and individual needs vary. Induction of labor is an option that should remain as a tool of the obstetricians' labor and delivery toolbox, and not as a routine universally accepted to be required. The use of inventions such as induction increases the cost of labor and the risk/benefit ration should be weighed with each pregnant induvial and their unique situation (NASEM, 2020; Souter et al., 2019).

**Research Question 3**

Research Question 3, whether there was a significant association between provider type (family medicine and OB/GYN) and augmentation in healthy pregnancies

was answered with the presence of a significant association between provider type and labor augmentation. With a *P* value of < .05, p =.034, the logistic regression results indicated there is an association between provider type and labor augmentation. Indicating labor augmentation with an FMP is 22% less likely to occur than with a OB/GYN.

The results of RQs 2 and 3 uphold the current literature indicating labor interventions, including labor augmentation, are less likely to occur with an FMP than an OB/GYN (Avery et al., 2014; Balyakina, 2016; Mac Dorman et al., 2014; Wiegers, 2003). The landmark study of Rosenblatt et al. (1997) indication of lower use of labor interventions by FMPs continues to be supported. In addition, Avery et al. (2014) stated the FMPs often follow an expectant care model of obstetric management, also known as low intervention labor management. The results of the analysis of RQ2 and RQ3 support the Avery et al. findings, the stance of the AAFP (2018) and ACOG (2019).

The AAFP (2018) and ACOG (2019) recommendations and committee opinions state there is a need to reduce the amount of interventions and technology in low-risk labors. This includes all forms of labor induction and augmentation. The findings of this study indicate FMPs use fewer interventions (labor and induction and augmentation) than OB/GYN's.

A subanalysis of RQ3 was conducted to determine if an association existed between provider status and labor augmentation. A significant association was not determined. With a *P* value > .05, p = .154, there is not significant association. The results of the sub analysis indicate there is not an increased risk of a labor augmentation

with a resident managed labor versus an attending physician managed labor (OB/GYN or FMP).

**Research Question 4**

***Significant Relationship Between Induction and Poor Birth Outcomes***

Research question 4, whether there was a significant association between labor induction and labor and delivery outcomes for the birthing dyad in healthy pregnancies was answered with the presence of a significant association. With a *P* value < .05, p = .000, indicating there is a decrease in a good labor and birth outcome of 23% when labor induction occurs.

The results of the analysis support the body of literature indicating poor outcomes and an increase risk of surgical intervention with labor induction (Jansen, 2013; Mayberry et al. 2017; Simpson, 2017). Additionally, the impact of induction prior to term (39 weeks) is associated with poor outcomes including neonatal mortality and increased morbidities (Mayberry et al., 2017). Grobman et al. (2018), Souter et al. (2019), and others have indicated that induction at term and post-term are associated with fewer cesareans and positive health outcomes compared to expectant management. For this dissertation study I reviewed labors from 36.6-42 weeks and encompassed early-term-post-term labors.

A consideration must be made for the imperfect science of due date prediction. A due date is an estimate based on a combination of the last menstrual period (LMP) and a first trimester ultrasound fetal length measurement (Cunningham et al., 2018). The estimated due date (EDD) is a guide used to track growth and development of the fetus.

However, as an estimate an EDD is a time frame that may be plus or minus two weeks. This is where induction at term can become risky. If the EDD is not correct, the neonate maybe born preterm and at significant risk of a co-morbidities such as low birth weight, poor tolerance of labor, increased risk of cesarean, and risk of additional interventions (NASEM, 2020).

**Research Question 5**

Research Question 5, whether there was a significant association between augmentation and labor and delivery outcomes for the birthing dyad in healthy pregnancies was answered with lack of a significant association. With a *P* value of > .05, p =.137, the logistic regression results indicated there is no association between labor augmentation and labor and delivery outcome. Indicating labor and delivery is not negatively impacted by labor augmentation.

These results do not support the body of literature which indicates there is an association. Previous studies, such as those conducted by Jansen (2013), Mayberry et al. (2017), Rosenblatt et al. (1997) and Simpson (2017), have indicated there is an association between labor augmentation (a labor intervention) and subsequent interventions which often result in a poor outcome. However, these studies differ in their assessment of multiple interventions and the cascading effect on labor and delivery outcomes. In this dissertation study this research question did not assess the effect of one versus multiple interventions, I focused on the use of augmentation in general.

It is important to consider that this was a small sample size with one urban academic setting and may not be reflective of the use of labor augmentation as whole.

The use of labor augmentation and standard management of labor in this academic institution may differ from other institutions.

## Limitations of the Study

The limitations for this study that were beyond the control of this researcher included, medical record accuracy, the nature of how the dataset was obtained (through an internal QI project), location, and year of physician learner residency status (intern Y1, Y2, etc.).

### Medical Record Accuracy

A medical record is generally accepted as an accurate and representative of objective, subjective, and actions or treatments provided. In academic medical centers medical notes are often created by physician-learners including medical students, physician-learners and residents, fellows, and attendings.

### Nature of the Dataset

The study data were retrieved from one internal quality improvement project. The retrospective dataset included, in its entirety, a 5-year period that contains data which was excluded from the study. Data exclusions included: patients of providers who do not practice or deliver at the institution, patients that live outside of the metropolitan area, patients who fall into moderate-risk and high-risk categories (e.g., diabetes, hypertension, multiple fetuses) and patients who received no or less than three prenatal care visits (documented in the labor admission record).

The methods of data extraction are considered to be imprecise, may contain errors, and when unstructured data is obtained, interpretation errors may occur.

Additionally, the dataset for the study contained dichotomous data only, resulting in a change from multinomial logistic regression (as indicated in Chapter 3) to binomial logistic regression data analysis.

**Study Location**

This study was conducted from one urban academic center and may not be reflective of all urban academic centers labor management practices, or reflective of their number of providers, provider types, or resident managed labors. The medical record maybe incomplete due to physician-learners and medical students entering large portions of the notes. Additional limitations include non-medical interventions that took place outside of the medical center prior to admission for labor that may impact outcomes.

**Physician-Learner Status**

The dataset did not indicate the program year for residents (Intern or Y1, Y2, etc.), which could be behind the finding of no significance when assessing a relationship between provider status and labor and birth outcome. An unexpected limitation is the low number of attending managed labors and deliveries compared to residents. Of the 2515 labors, 92 or 4% were managed by attending physicians, and 96% were managed by residents. A G*Power analysis was conducted and the total number of attending managed labor and delivery was determined to be large enough for comparison purposes.

# Recommendations

## Larger Scale Replication of this Research in Multiple Urban Academic Medical settings

The study results led to the following recommendations. First this study should be replicated on a larger scale including multiple urban academic medical settings of similar size across the country with OB/GYN and FMP obstetrical residencies.

## Meta-Analysis of Labor and Delivery Recommendations Across Provider Types

Second, a meta-analysis of all obstetrical care and labor and delivery recommendations across all obstetrical provider types (OB/GYN, FMP, Certified Nurse Midwives & Certified Professional Midwives) would benefit those who provide prenatal, labor management, and delivery care. In addition, this could also provide a clear understanding of cross sector recommendations, evidence-based and best practices in obstetrical care.

## Research on the Impact of Resident Led Management of Birth

Thirdly, future research and publication of the impact of resident led management of labor and delivery compared to that of attendings and fellows could add to a limited body of knowledge. It is worth noting that I was able to find no published literature of resident versus attending use of labor interventions in academic settings as of the writing of this dissertation in 2019-2020. Additional research into the practices of physician learners/resident's through QI projects could be a powerful tool in determining physician practice methodology, safety and efficacy of teaching and practice methods in academic settings (NASEM, 2020).

The assumptions of the study were limiting. The strength of the study data relied on the completeness and accuracy of a medical record which was predominantly completed by physician-learners and medical students.

## Implications

### Collaborative Practice Settings

Improving maternal and infant health is a commonly understood goal by the MCH professional organizations and their members. Hence the routinely updated ACOG, AAFP, and SMFM practice statements. Collaborative work between obstetrical care governing bodies for each provider type, the American College of Nurse Midwives (2018), ACOG, AAFP and AOCG (2018), elaborate on the need to work collectively and commit to respectful shared patient practices, to work towards collaborative practices, a reduction in intervention use, a return to physiological birth, and to respect patient autonomy in decision making.

In the 2020 *Birth Settings in America* report, NASEM highlighted the need for continued efforts in collaborative and collective work, and a need to continue quality improvement (QI) projects such as the one this study was based on. As we continue to see multidisciplinary teams provide comprehensive and integrative care to expectant families, we will continue to see improvements in overall health. Newly emerging data, literature, reports, initiatives, tool kits and safety bundles are leading the way to innovative methods to care for our lowest risk pregnancies and co-management for our highest risk ones (NASEM, 2020).

**Practice Variations in Provider Types**

Understanding the nuances between provider practice methodologies and the impact they may have is key to improving labor and delivery outcomes. This is best explored in academic settings where physician-learners are not only exposed to innovative and up to date practice styles, but also to strong but reportedly harmful routine practices that enhance policy makers and financial bottom lines or those taught by faculty that are unwilling to adapt to current recommendations. Significant practice variations existing amongst provider types, and within their own practice methodology. Often healthy low-risk labors are exposed to practices and care methods that are not aligned with ACOG 2018 guidelines but are often intended for those with pregnancy complications or other high-risk factors (NASEM, 2020).

**Uptake of Practice Innovations**

Using a theory such as DI, residency programs for all provider types could begin to reshape their residency programs to better align with current recommendations for their provider type (OB/GYN, FMP, etc.) This study did not approach the qualitative QI aspects of updated practice guidelines uptake, however, future studies could. From the analysis of this study data, we can see that labor induction occurs in 37% of all labors, and 74% of all labors are augmented at this one urban academic center, and FMPs are 38% and 22% less likely to use labor induction and augmentation respectively. The indication, based on DI theory, would be that FMPs are more likely to follow new guidelines and recommendations in the use of intervention in labor and birth. This study was not conducted in a manner which would indicate the reasoning each provider used to

explain their use of labor interventions (e.g., policy, routine, ACOG guidelines, or patient need)

### Risk Assessment and Quality Improvement

Aligning risk assessments with quality improvement reporting (both use of intervention and patient perceptions) would allow for a more robust understanding of how and why labors are medicalized, when they need to be, and when practitioners should allow the naturally occurring physiological process to take place. Academic medical centers are hubs for training innovations across specialties. This includes the training of FMPs in all areas of obstetrics including obstetrical surgeries (American Board of Physician Specialties, 2018), making them the ideal place to assess innovation, innovation uptake, quality of practice, and labor and delivery outcomes.

## Conclusions

Ideally, OB/GYNs and FMPs would practice obstetrical care in a similar manner, following ACOG guidelines and practice updates, while adhering to their specialty practice methodologies (Zolotor & Carlough, 2014). This study upholds the previous research and foundational literature by ACOG (2019), Avery et al. (2014), Grobman et al., 2018, NASEM (2020) and Roseblatt et al. (1997) and others indicating FMPs use interventions less often, without an increased risk of a poor labor and delivery outcome for birthing dyads.

The way laboring individuals receive care, and where, continues to be an area under increasing scrutiny with provider types, settings, and supportive measures as focal points (NASEM, 2020). Just before the completion of this dissertation study, NASEM

issued several recommendations as a result of their study on birth settings and labor/birth providers and practices including new practice guidelines for maternity care and Perianal Quality Collaboratives have been formed (NASEM, 2020).

**Routine Intervention and Risk**

Additionally, Rosenblatt (1997) continues to be supported in their theory of "perinatal paradox" which occurs due to the use of labor intervention(s) routinely added to a laboring individual without recognition or regard to the physiological, emotional, or financial implications, and/or understating of the limited benefit to poor outcome potential. The economics of childbirth continue to play a significant role in how and when interventions are monetized (Brown, 2018). A great potential for maternal and infant health improvement resides in the ability to improve obstetrical practices, including labor and delivery (NASEM, 2020). Trends in the way in which interventions, care routines, and practice methodologies are implemented require transparency, study, and iterations aligned with emerging science and recommendations.

If we continue to routinely intervene in labor and delivery as we have, 74% of labors in this study (Table 2) and 1 in 4 in the U.S. (Cunningham et al., 2018), we will continue to fail our moms and babies, ignore the growing body of knowledge supporting physiological birth, and result in a continued increase in maternal and infant mortality and morbidity. We can create social change by reducing the frequency of routine interventions (medically enhanced) in labor, following evidence-based and established best practices and recommendations (ACOG, 2019; AAFP, 2018; NASEM, 2020).

Following evidenced based best practices will potentially improve the lives of many birthing dyads and will lead to the better health of all families and communities.

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