

EXAMINATION OF PERINATAL CARE PROCESSES AND OUTCOMES OF
CHILDBEARING MEDICAID BENEFICIARIES REPORTED WITHIN
THE 2012-2014 AMERICAN ASSOCIATION OF BIRTH
CENTERS PERINATAL DATA REGISTRY

A DISSERTATION
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
IN THE GRADUATE SCHOOL OF THE
TEXAS WOMAN'S UNIVERSITY

COLLEGE OF NURSING

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DENTON, TEXAS

DECEMBER 2016

DEDICATION

I dedicate this dissertation to the 6,856 childbearing Medicaid beneficiaries enrolled with Center for Medicare and Medicaid Innovation Strong Start Site birth centers between 2012-2014. Your strength, courage, and struggles are real. May the stakeholders influencing access to evidence-based care for Medicaid beneficiaries listen to your stories, acknowledge your potential, and pursue the optimal outcomes you achieved.
May your children grow with health, wellness, confidence, equity, and peace.

ACKNOWLEDGEMENTS

To my loving, supportive, funny, and encouraging husband, Jeremy Jolles. You are the best thing that ever happened to me. Thank you for your support of this research and all my professional endeavors. To my parents, Lois and Ivan Caplan, the first people to teach me that “more is not better.” I am eternally grateful for the upbringing, values, education, support, and encouragement you have provided. To every midwife, nurse, physician, and staff member who volunteered time and energy to enter data into the American Association of Birth Centers Perinatal Data Registry. May your time, work, and energy not be in vain. To the visionary leadership of Dr. Susan Stapleton and the interprofessional team who created and maintain the American Association of Birth Centers Perinatal Data Registry. The inspiration, expertise, determination, and sacrifices have not gone unnoticed. To the nuns, nurse-midwives, nurses, doulas, and staff of Holy Family Services Birth Center in Weslaco, Texas where the topic of appropriate use hit the national stage. The model of care, service learning, family-centeredness, and attention to appropriate-use demonstrate optimality to a nation desperate for solutions.

To Texas Woman’s University College of Nursing in Houston. It was a pleasure to be afforded the ability to enjoy doctoral studies with the nurturing guidance, expertise, and passion of the faculty and scholarly community. My extended gratitude to Dr. Rae Langford. Your expertise in large data set analysis, education, statistics, timeliness, and mentorship are exemplary. I hope to be a nurse-educator like you when I grow up! To

Frontier Nursing University. Your support of midwifery-led care, birth centers, scholarship, and faculty development is prototypical.

To the professionals who have made indelible marks during my doctoral studies, thank you: Sister Angela Murdaugh, Ruth Lubic, Lorie Kline Kaplan, Tina Johnson, Leslie Cragin, Jill Alliman, Carol Sakala, Maureen Corry, Karen Perdion, Lisa Lowe, Nancy Lowe, Daisy Goodman, Jessica Schwarz, Cathy Emeis, Cara Osborne, Elisabeth Howard, Patricia Olenik, Nivia Nieves Fisch, Tonya Nicholson, Julie Marfell, Susan Stone, Kitty Ernst, Nikki Demetriou, William “Buzz” Brown III, Krisanne Graves, Dee Dolan, Judith Butler, and Kathryn Schrag, Molly MacMorris-Adix, Crystal Stewart, Madeleine Bebee, Jesse Bushman, Paula Peltier, Beth Overton, and Lana Bernatt.

ABSTRACT

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EXAMINATION OF PERINATAL CARE PROCESSES AND OUTCOMES OF CHILDBEARING MEDICAID BENEFICIARIES REPORTED WITHIN THE 2012-2014 AMERICAN ASSOCIATION OF BIRTH CENTERS PERINATAL DATA REGISTRY

DECEMBER 2016

The purpose of this dissertation study was to describe selected processes and outcomes variables for Medicaid beneficiaries enrolled and giving birth with American Association of Birth Centers Center for Medicare and Medicaid Innovation Strong Start sites between 2012 and 2014. The goal was to examine the relationships between selected care processes and outcomes of childbearing Medicaid beneficiaries to inform research, practice, and policy. Processes of care and the outcomes of Medicaid beneficiaries receiving care within the model exceeded national quality benchmarks, demonstrated resistance to unwarranted variation, and led to increases in effective care and preference-sensitive variations. Supply-sensitive variations were demonstrated within the sample of Strong Start sites with the elective hospitalization of healthy, medically-low-risk women leading to significantly more cesarean sections than women choosing home or birth center admission in labor. The dissertation contributes to scientific knowledge and supports expansion of the model among Medicaid beneficiaries nationwide.

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CHAPTER I

INTRODUCTION

In 2010, the Institute of Medicine (IOM) released “The Healthcare Imperative: Lowering Costs and Improving Outcomes” in which excessive and inefficient utilization of healthcare services were identified as top drivers of unsustainable healthcare spending. It is projected that by 2018 the United States will spend \$4.4 trillion on healthcare annually, far exceeding other nations while achieving poorer health outcomes than most developed countries. The most expensive conditions billed to Medicaid and private insurers in the US relate to pregnancy, childbirth, and care of the newborn, totaling over \$92 billion annually (Weir and Andrews, 2006). Yet, the cost of childbirth was not discussed in the 853-page IOM report, nor well represented in the national quality movement, nor part of federal and state regulatory policy agendas. The excessive cost of childbirth in the United States should be a high priority for tax payers, since 48% of the 4 million births annually are paid for by Medicaid (Markus, Andres, West, Garro, & Pellegrini, 2013).

More than 80% of the cost of care for the childbearing population is for the birth itself, mostly hospital facility fees (Agency for Healthcare Research and Quality, 2013; Truven Health Analytics, 2013). Hospital facilities have not proven to be reliable for childbearing families, producing poor quality outcomes at an excessive cost (Sakala and Corry, 2008). For decades, the U.S. perinatal care system has failed to match the needs of

childbearing population with appropriate care resulting in inappropriate use of intervention, failed accountability to shared decision making and non-compliance with evidence-based standards of care (MacDorman, Declerq, and Zhang, 2010). Facility driven overuse of technology and procedures (e.g., routine ultrasonography, elective induction of labor, cesarean section, routine formula supplementation) and under-use of effective interventions (i.e., prenatal education, group prenatal care, continuous labor support, hydrotherapy, uninterrupted breastfeeding in the first few hours of life) threaten quality and increase cost.

Problem of Study

This dissertation study extends explorations from a 2012 pilot study investigation that demonstrated endorsed quality outcomes for Medicaid beneficiaries within the perinatal data registry exceeded publicly reported national perinatal quality outcomes (Jolles, 2013). The study evaluates the process and outcome measures of 3,136 Medicaid beneficiaries giving birth with the American Association of Birth Centers (AABC) Center for Medicare and Medicaid Innovation (CMMI) Strong Start Sites between 2012 and 2014.

Rationale for the Study

Little national attention has been placed on documenting unwarranted variations among childbearing Medicaid beneficiaries despite the high prevalence of childbirth and childbirth related payments by Medicaid within our national deficit. For decades, research has demonstrated the existence of unwarranted variations in select perinatal quality measures like induction of labor (Glantz, 2011), episiotomy (Webb and Culhane,

2002) cesarean section (Baicker, Buckles, and Chandra, 2006; Clark, Belfort, Hankins, Meyers, and Houser, 2007; Coonrod, Drachman, Hobson, and Manriquez, 2008; Gregory, Ramincone, Chan, and Khan, 1999; Hanley, Janssen, and Greyson, 2010), and breastfeeding initiation (Kruse, Denk, Feldman-Winter, and Mojta Rotondo, 2005; Ryan, Zho, and Gaston, 2004). This research study offered an unprecedented opportunity to evaluate a sample of childbearing Medicaid beneficiaries receiving midwifery-led care which has been prospectively documented using an electronic data registry capturing 189 variables. The details contained within the perinatal data registry exceed nation perinatal reporting systems including birth certificate and claims data, which do not include the details required to analyze the concept of unwarranted variation. The exploration informs both practice and policy demonstrating nurse-midwifery led care and midwifery- led prospective, data registries thereby contributing to the body of nursing scholarship. This, in turn, generates a clear mechanism for lowering the spiraling Medicaid costs for childbirth that currently plays a significant role in the estimated 700 billion dollars wasted nationwide in unwarranted care (Lallemant, 2012).

Conceptual Framework

The dissertation study uses the conceptual framework built around the concept of “*unwarranted variation*” to analyze perinatal quality among Medicaid beneficiaries (Figure 1). Unwarranted variation is defined as variation in the use of healthcare services that cannot be explained by the variation in patient illness or preference (Wennberg, 2011).

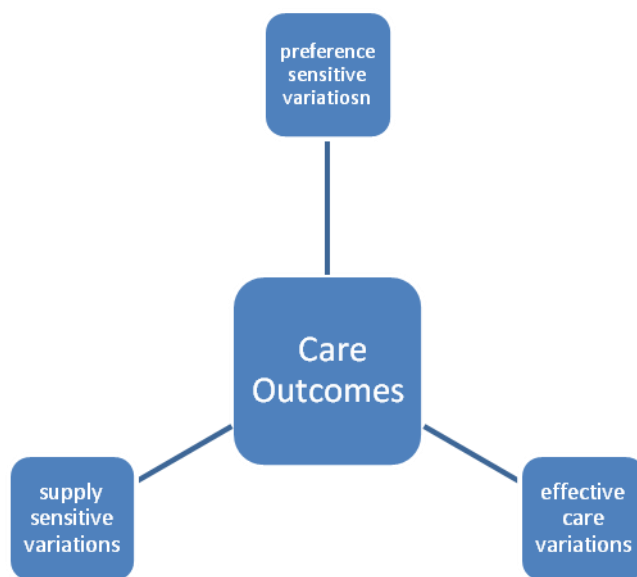


Figure 1. Unwarranted variations in care.

First described in 1938, the concept of unwarranted variation began in an evaluation of British school children and tonsillectomy rates (Wennberg, 2011). In 1967, John Wennberg used the concept to demonstrate variances of healthcare utilization in Medicare populations in Vermont. Findings revealed random variances of medical spending and in use of resources (Wennberg, 2014). Since this time, the concept of unwarranted variation has been the subject of 836 publications worldwide (Corallo et al., 2014). This systematic review of medical practice variation demonstrated that a minority of hospital admissions are characterized by low variation. Rather, 90% of hospital admissions reflected high variation related to non-medical factors such as provider specialty, supplier-induced demand, and healthcare resource capacity that drive costs—not client need or preference. In this sample of studies within the systematic review, less

than 3% of the studies evaluated variations in obstetrics and none of the studies evaluated variations in physiologic birth quality measures among Medicaid beneficiaries in the United States. While the framework of unwarranted variation has not been used to evaluate childbearing Medicaid beneficiaries, the concept of overutilization within this population is well documented. Between 1984 and 2009, overutilization of physiologic birth measures was published in 32 peer-reviewed articles totaling 20 million births in the US (Jolles, 2013).

The conceptual framework of unwarranted variation in care builds on three sources of variations: effective care variations, preference-sensitive variations, and supply-sensitive variations. Variations in effective care demonstrate underuse of appropriate care. Care is deemed effective and appropriate when scientific evidence supports that a total patient population should be receiving an identified intervention because the benefits far outweigh the risks. Examples of effective care variation include prenatal education, hydrotherapy, continuous professional support in labor, and fetal monitoring in labor. Unwarranted variations in effective care occur when the population does not reliably receive the prescribed care.

Preference-sensitive care variations occur within the context of equivocal scientific knowledge, whereby the provider or patient could reasonably choose more than one treatment option, such as elective induction after 40 weeks gestation, use of anesthesia in labor, circumcision, or breastfeeding. Research suggests that provider opinion and preference drives the majority of healthcare decisions in these cases, leading to unwarranted and increased use of technology and aggressive treatment interventions

(Anthony et al., 2009). Variations of preference-sensitive care often lead to overuse, and increased costs without improving outcomes.

Supply-sensitive care variations relate directly to the capacity of the environment (e.g., number of providers, types of providers, types of diagnostic tests, procedures, and insurance type). These variations often bear little relationship to what the patient needs or wants and lead to overuse, increased cost, and decreased quality. For childbearing women, provider ratios and disciplines (e.g., obstetrics, perinatology, family practice, and midwifery), access to neonatal intensive care, and ultrasonography access frequently lead to supply-sensitive variations that increase cost and decrease value.

There are four outcomes of interest relating to unwarranted variations in care in this study. They include: elective induction of labor, episiotomy, cesarean delivery, and breastfeeding.

Elective induction refers to the artificial provocation of labor without medical warrant. Elective inductions occur nationwide for patient or provider preference, despite known harm. A recent review of over 200,000 electronic medical records from 19 hospitals in the United States demonstrated that 42.9% of nulliparous and 31.8% of multiparous women experienced induction of labor, with 35.5% and 44.1% respectively demonstrating no recorded medical indication (Laughon et al., 2012). In this study, nulliparous women at term undergoing elective induction with no medical reason had an associated 24% increased rate of operative delivery.

Intermountain Healthcare, a system in Utah reporting over 32,000 births per year, reported a significant rate of elective inductions before implementing a quality improvement project to eliminate inductions prior to 39 weeks gestation. After implementing strong evidence-based, elective induction of labor guidelines and process resistant to unwarranted variations, elective inductions decreased from 28% to 2%. This resulted in a cost savings of \$50 million annually over three years. If applied nationally, these results would yield estimated savings of \$3.5 billion annually (James and Savitz, 2011).

The routine use of episiotomy for childbearing women is a practice documented for decades to cause harm (Goer and Romano, 2012). Harm from routine episiotomy includes increased and recurrent anal sphincter lacerations, increased post-partum pain, wound complications, and adverse effects on sexual function; it has also been demonstrated to be ineffective at decreasing extent of perineal trauma, improving neonatal outcomes, preserving pelvic floor function, or preventing or relieving shoulder dystocia (Goer and Romano, 2012). Yet unwarranted variations in use of routine episiotomy persist today. Eighteen hospitals in the Philadelphia metropolitan area were evaluated using the perinatal data registry to analyze the incidence of episiotomy use between 1994 and 1998. A total of 16,722 nulliparous deliveries were evaluated to quantify variations in practice. Episiotomy rates ranged from 20.3 % to 73.0% among hospitals. Subsequent and related third and fourth degree lacerations varied from 4% to 13.3% between hospitals within the sample. Patient medical risk factor and variant need were not demonstrated within the sample (Webb and Culhane, 2002).

Reducing the cesarean section rate in the United States is a strategic priority for all stakeholder groups including: The Association of Women's Health, Obstetric and Neonatal Nurses, and the American College of Nurse-Midwives, along with leadership by the American College of Obstetrician Gynecologists and the Society for Maternal Fetal Medicine (Obstetric Care Consensus, 2014). An analysis of birth certificate data between 1995 and 1998 evaluated 10.2 million births in 198 U.S. counties demonstrated a large percentage of unexplained variance in use of cesarean section, ranging from 6.7% to 28.9%, controlling for medical risk status (Baicker et al., 2006). In this sample, the total unexplained variance of the procedure within the normal birth weight population was 40.5%. Unexplained variations in operative delivery were labeled as the "practice style" of an area and documented to be unrelated to patient need or characteristics of the area (Baicker et al., 2006, p. 363).

The largest single system study of unwarranted variation in cesarean section notes patterns of "almost random decision making" upon reviewing 124 birth facilities associated with the Hospital Corporation of America (HCA). In a review of almost 220,000 births in a one year period, the primary cesarean section rate ranged from 9% to 37%, with geographic variations of up to 300% (Clark et al., 2007).

According to a study conducted by Main et al. (2006), over a three year period in one facility with over 41,416 births, cesarean delivery was strongly influenced by other elective practices. A second study of the nulliparous, term, singleton, vertex cesarean delivery rate reviewed 28,863 qualified births at 40 Arizona hospitals. The range of cesarean between hospitals in the sample was 10.3% to 34.2%, and a significant

relationship was found between the procedure and non-clinical factors including percent of governmental deliveries, percent of induced labors, hospital ownership type (government, not for profit, for profit), level of nursery, OB/GYN residency program, in-house OB/GYN, and in-house anesthesia (Coonrod et al., 2008).

In 2011, a study of 533,384 births including 187,780 nulliparous, term, singleton, vertex (NTSV) cesarean deliveries documented large inter-regional variation (Main, Morton, Giuliana, Melsop, and Gould, 2011). In this sample, the range of NTSV cesarean section is 10-50%, demonstrating a significant influence of non-medical factors. Geographic variation is seen with 75% of hospitals reporting NTSV rates above 28% in the Los Angeles region, while 75% of hospitals in the San Francisco area maintain rates below 28%. Similarly, in 2006, a study of 10.2 million births in 198 counties documented large variation in risk-adjusted cesarean rates (6.7%-28.9%) (Baicker et al., 2006). The unexplained variance for normal birth weight babies was 40.5%, demonstrating an inverse relationship between cesarean rates and medical appropriateness within this population. In a 2006 evaluation of 41,416 NTSV births in 25 hospitals in Northern California, large variation in cesarean section was observed with 25% of the hospitals having nulliparous induction and early labor admission of 60% or greater (Main et al., 2006). In this study, 53% of the variation in NTSV cesarean rates among hospitals was explained by induction and early labor admission practices.

Unwarranted variation in breastfeeding, not explained by patient need or preference, has been documented at the regional, geographic, facility, hospital policies, practices and staff behaviors, and third party payer type (Ryan et al., 2004; Kruse, Denk,

Feldman-Winter and Mojta Rotondo, 2005). In the 2007 National Survey of Children's Health, significant in-state and interstate variations in breastfeeding initiation persist even when controlled for race and ethnicity (Belanoff, McManus, Carle, McCormick, and Subramanian, 2012). Unwarranted variations in breastfeeding are poorly studied or represented within the literature, though clear evidence exists to demonstrate that the majority of perinatal systems in the United States are not providing evidence-based breastfeeding care to mother/baby dyads. Exclusive breastfeeding on discharge remains one of the most professionally debated perinatal quality measures within the NQF endorsed measure set, largely due to the concern women have the right to formula feed and the misunderstanding that exclusive breastfeeding is a proxy measure for quality prenatal education, commitment to shared decision making, and evidence-based care practices. Less than 5% of Joint Commission hospitals routinely report this measure and report the woman's feeding intention and its correlation with discharge feeding method.

Assumptions

Assumptions of the conceptual framework of unwarranted care variations include:

1. Childbearing Medicaid beneficiaries within the American Association of Birth Centers (AABC) Perinatal Data Registry (PDR) demonstrate resistance to "unwarranted variations" previously documented within the literature on utilization and physiologic birth perinatal quality measures.
2. The AABC PDR is a reliable and valid tool to evaluate unwarranted variations in care to Medicaid beneficiaries.

Research Questions

The following research questions are addressed in this study:

1. Describe selected effective care, preference sensitive, supply-sensitive processes, and outcome variables for Medicaid beneficiaries.
2. Examine the relationships between selected care processes and outcomes of childbearing Medicaid beneficiaries

Definition of Terms

The American Association of Birth Centers established definitions for all data contained within the perinatal data registry. These definitions are aligned with the national quality movement definitions across disciplines.

Independent Variables

Independent variables are divided by variation type with definitions taken from the American Association of Birth Centers Perinatal Data Registry Instruction Manual (2012).

Antenatal Care. Antenatal variables are defined as follows.

- *Intended place of birth:* This field is required, and the record cannot be approved without an entry.
 - *Birth Center:* A homelike facility for normal birth that is not a residence. May be freestanding or inside the hospital, but is separate from the hospital labor and delivery unit, with different policies and used only for normal birth.

- *Home*: Use for any birth occurring at a residence, including the mother's, the midwife's (if it is not a birth center), or someone else's.
- *Hospital*: A hospital or OB or maternity unit. Does not include in-hospital birth centers that are separate from labor and delivery and are designed only for normal birth.
- *Payment method*: Categorically defined by provider as Medicaid, Medicaid fee for service, or Medicaid Managed Care. A state managed health plan with joint state and federal funding including Medicare, Children's Health Insurance Program (CHIP).
- *Prenatal classes*: None: use if patient has never had prenatal classes and did not attend during current pregnancy. Attended previously: use if patient attended prenatal classes in a previous pregnancy but not in current pregnancy. Birth center/practice- use: if patient attended classes taught within your practice, either by your staff or an outside childbirth educator. Other: Bradley, Lamaze, Hypnobirthing, or other childbirth educator unrelated to your practice. Group prenatal care: centering or other model of group prenatal care.
- *Prenatal testing*: Only if outpatient. Continuous variable includes the absolute number of times performed prior to intrapartal admission: Non-stress test/ contraction stress test, Biophysical Profile/ Amniotic fluid index, Amniocentesis/ Chorionic villi sampling, Ultrasound.

- *Primary antepartum provider:* This is the provider(s) who had primary responsibility for the patient's care during her pregnancy and with whom she had the largest number of visits. If the patient's care was managed collaboratively by the midwife and physician, or by midwife and more than one physician (e.g., midwife, OB, and perinatologist), select the provider who played the greater role in management of the patient's care. Categorical variable—nurse-midwife (CNM) or Certified Midwife (CM). Family physician, midwife (certified professional midwife, licensed midwife, certified direct entry midwife, direct entry midwife), obstetrician.

Intrapartum Course. Intrapartum course variables are defined as follows.

- *First admission to care:* The location in which the provider initially began to provide care—either a facility or the patient's home (if a planned home birth). If the patient delivers elsewhere and is admitted to your care post partum, enter the site to which she was admitted to your care post partum.
 - *Birth Center:* A homelike facility for normal birth that is not a residence. May be freestanding or inside the hospital, but is separate from the hospital labor and delivery unit, with different policies and used only for normal birth.
 - *Collaborative Hospital:* A hospital OB or maternity unit with which you have a collaborative relationship (not necessarily staff privileges or a formal agreement). Does not include in-hospital birth centers that are separate from labor and delivery and are designed only for normal birth.

- *En Route*: The patient delivered in a car or ambulance while en route to a facility.
- *Perinatal Care or Other Hospital*: The patient delivered at another hospital without the primary care provider in attendance—either because she presented there on her own or was instructed to go there by her provider.
- *Planned home*: Use for any birth occurring at a residence
- *Unplanned home*: Patient delivered at home, with or without the primary care provider in attendance but had NOT planned to give birth at home.
- *Infant feeding on discharge*: Singleton or first twin. Categorical, select 1. Breast milk, formula, combination breast/formula, other. Enter the feeding method in use when the mother and infant are discharged from the place of birth. If the infant is transferred or retained in hospital, enter feeding method at time of discharge.
- *Monitoring during labor*: Enter all methods in any setting. Once you select a method of monitoring, other questions appear to allow you to enter more information about each method. Palpation, Intermittent Auscultation Only, Initial Electronic Tracing, then Intermittent Auscultation, Continuous Electronic. If Intermittent Auscultation only, specify: Doppler, fetoscope, electronic monitor. If initial electronic tracing, then intermittent auscultation only, specify: Doppler, fetoscope, electronic monitor. If, continuous

electronic, specify: external fetal heart tones, external uterine, fetal scalp electrode, internal uterine pressure catheter.

- *Pain relief, non-pharmacological*: Select all that apply, categorical.
 - *Acupuncture*: Do not use if purpose was augmentation of labor rather than pain relief.
 - *Aromatherapy*: Use of scent for comfort or promote relaxation, e.g., candles, essential oil, flowers.
 - *Auditory/music/vocalization*: Use of sound for comfort or to promote relaxation; e.g., music, chanting, singing, vocalization, voices, white noise, moaning.
 - *Heat/cold*: Use of heat or cold for comfort or pain relief, e.g., ice pack, hot pack, topical heat gel.
 - *Herbal/homeopathic*: Specify name of herb or homeopathic remedy
 - *Hydrotherapy*: Use of water for comfort and to promote relaxation, e.g., shower, tub, pool, Jacuzzi.
 - *Hypnosis/imagery*: Use of mental imagery for comfort and to promote relaxation, e.g., self-hypnosis or hypnosis by others, visualization, meditation, prayer.
 - *Intracutaneous sterile water injection*: Injections of sterile water underneath the top layer of skin for the purpose of pain relief. Used for back pain caused by baby in posterior position.

- *Massage/tactile/acupressure*: Use of touch for comfort or to promote relaxation, e.g., effleurage, massage, counter-pressure, stroking, patting, hand or other body part of the resting body on patient, vibrator, massager. Includes use of pressure at acupuncture points if used for pain relief.
- *None*: The patient had no type of non-pharmacologic pain relief. Use if the patient received an epidural with no use of these methods or if the patient delivered immediately upon arrival. Do not include non-pharmacological methods of pain relief used by patient prior to admission.
- *Position/ambulation*: Includes pacing, walking, swaying, standing, kneeling, squatting, sitting in a chair/on stool/on toilet/on ball, hands and knees, knee chest, lateral.
- *Transcutaneous electronic nerve stimulation (TENS)* : Used for pain relief.
- *Other*: Indicate unlisted non-pharmacologic method.
- *Unknown*: Use if patient gave birth at your hospital with another provider or at another location and you do know what methods of pain relief were used.

- *Pain relief pharmacological.* Select all that apply.
 - *Epidural:* Injection of local anesthetic and/or narcotic into epidural space for analgesia or regional anesthesia. Received epidural or intrathecal analgesia or anesthesia for pain relief in labor or for operative delivery.
 - *General:* Anesthetic gas used for cesarean section or other operative procedure and rendered patient unconscious.
 - *Local:* Lidocaine or other agent infiltrated or applied topically for local anesthesia- includes local for repair of laceration or episiotomy. Also included local anesthetic gel used on perineum prior to birth.
 - *Narcotic analgesia:* Any narcotic or other medication in labor given IV or IM for pain relief in labor. For example, Nubain, morphine, Stadol, fentanyl. Does not include intrathecal narcotics.
 - *Nitrous oxide:* Mixture of nitrous oxide and oxygen inhaled for pain relief during labor or during painful procedure such as manual placenta removal or repair.
 - *None:* Patient received no drugs for the purpose of pain relief in labor. May have received drugs for purposes other than pain relief, e.g., antiemetic.
 - *Pudendal:* Injection of pudendal nerve with local anesthesia.
 - *Spinal:* Injection of local anesthetic into the spinal fluid for regional anesthesia.

- *Primary attendant for birth:* The person who actually “caught” or delivered the baby. If a student (midwife, physician etc.) did so, enter the person actually responsible (i.e., Preceptor). If two individuals (e.g., midwife and physician or midwife and family member), enter the person who was primarily responsible. In the case of multiple gestation, with each baby delivered by a different provider, enter the person who was primarily responsible. If a resident attended birth, select obstetrician or family practice physician. Categorical variable, select one: nurse-midwife (CNM/CM), midwife (CPM, LM, CDM, DM), Family physician, Obstetrician, Family/support person, other.
- *Primary indication for transfer (neonatal intensive care admission):* Newborn referral or transfer. Transferred to (select only 1): newborn nursery, SCU, or NICU, pediatrics, other.
- *Support for labor:* Enter the person(s) who was with the patient in labor and who provided direct care. If the primary care provider was sleeping in the call room or was with another patient during most of the labor, do not enter here. Use student for any health professional student-nurse, midwife, physician. Includes doula or EMT in training. Categorical options include (select all that apply): nurse-midwife (CNM/CM), midwife (CPM, LM, CDM, DM), Family physician, Obstetrician, Family/support person, other.

- *Water birth*: Select no unless baby was actually born in the water. Do not use if mother was in the tub for labor but gave birth outside of the tub or in the tub with no water.

Post Partum. Enter number of *home visits* by birth center or by outside agency during the first six weeks post partum

Dependent Variables

The dependent variables consist of the National Quality Forum (NQF) Endorsed Measures that focus on normal, physiologic birth, and were chosen because of the scientific acceptability and multi-stakeholder endorsement. Definitions of dependent variables come from the National Quality Forum Specifications for Perinatal Care (2012). Dependent variables are defined as follows.

- *Elective induction of labor*: This quality measure is defined using the NQF Perinatal Endorsement criteria as the number of patients with elective (without medical indication) vaginal deliveries or elective cesarean sections at ≥ 37 and < 39 weeks of gestation completed.
- *Episiotomy*: This quality measure is defined using the NQF Perinatal Endorsement criteria as the percentage of vaginal deliveries (excluding those coded with shoulder dystocia) during which an episiotomy is performed.
- *Exclusive breastfeeding on discharge*: This quality measure is defined using the NQF perinatal endorsement criteria as the number of newborns exclusively fed breast milk feeding during the newborn's entire hospitalization.

- *Nulliparous term singleton vertex (NTSV) Cesarean Rate*: This quality measure is defined using the N QF perinatal endorsement criteria as the number of nulliparous women with a term, singleton baby in a vertex position delivered by cesarean section.

Limitations

The following limitations are identified for this study:

1. The sample is a convenience sample drawn from a secondary database generated by the point of care providers working primarily in 45 alternative birth settings across 21 states. While the AABC PDR offers a robust, prospective assessment of care processes and outcomes of childbearing Medicaid beneficiaries, choices about care seeking are unknown and may lead to sampling bias. This limits the generalizability of the study.
2. The sample for this study is predominantly medically low-risk and not generalizable to childbearing Medicaid beneficiaries with mixed medical risk status.
3. The conceptual framework is underdeveloped and may not identify or explain all sources and drivers of variation among childbearing women.

Summary

Childbearing Medicaid beneficiaries living in the United States are subject to unwarranted variations in care that affect quality and increase cost. The majority of childbearing Medicaid beneficiaries is medically low-risk and receives care that is characterized as medical model designed for women with medical risk factors. This research study evaluates a nurse-midwifery developed data registry that documents the

midwifery model of care, specifically the birth center model of care. The model's influence on care processes and outcomes of Medicaid beneficiaries is demonstrated. This exploration informs both practice and policy through nursing scholarship. Social and policy transformations are necessary to actualize changes in the predominant model of care for childbearing Medicaid beneficiaries. The dissertation study offers the preliminary steps.

CHAPTER II

REVIEW OF THE LITERATURE

UNWARRANTED VARIATION IN UTILIZATION OF CESAREAN BIRTH
AMONG LOW-RISK CHILDBEARING WOMEN

A paper accepted for publication in the
Journal of Midwifery & Women's Health

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The *Journal of Midwifery & Women's Health* granted permission to reprint this article as a chapter for this dissertation (Appendix B).

PRECIS

Low-risk childbearing women are vulnerable to unwarranted variations within the healthcare delivery system that cause overutilization of cesarean birth.

ABSTRACT

Introduction: Unwarranted variations in care are defined as differences in utilization of healthcare resources that cannot be explained by patient risk factors, standards of evidenced-based medicine, or patient preferences. Also known as non-medical determinants of variation, differences in healthcare utilization across the United States have been well documented in the literature over the past 40 years. The purpose of the literature review is to summarize the state of the science related to the non-medical determinants of variation in cesarean birth among low-risk childbearing women, defined

within national quality standards as nulliparous women with term, singleton pregnancies in the vertex presentation.

Methods: A literature search was performed using electronic databases PubMed, CINAHL, Ovid MEDLINE, Google Scholar, Cochrane Database of Systematic Reviews, and ProQuest Dissertation Database. Articles published in English, with full text available, including birth in the United States after 1995, are included in the analysis. Nine studies met criteria for inclusion. Forty-four states are represented within the data, with Arizona, California, Massachusetts, New Jersey, and New York being the subject of more than one of the publications analyzed.

Results: This literature review includes over 1 million births, in at least 44 states between 1996 through 2009, revealing significant unwarranted variation in cesarean birth. Non-medical determinants of variation, such as access to resources, hospital characteristics, payer source, and provider practice styles are identified as independent predictors of increased cesarean utilization in more than half of the studies reviewed. In all the studies reviewed, women of low-medical risk demonstrate susceptibility to unwarranted variation in the use of cesarean birth.

Discussion: Continued emphasis on the specific needs of low-risk childbearing women is necessary to decrease unwarranted variation in the use of cesarean birth in the United States. Specific attention to the costs of unwarranted variation in cesarean is imperative.

Keywords: quality, utilization, cesarean birth.

Quick Points

- After controlling for medical, social, and demographic risk factors, significant variations in cesarean birth exist among nulliparous women with term, vertex, singleton pregnancies.
- Supply-sensitive factors are changes in utilization of services based on the access to healthcare resources and strongly predict variation in cesarean delivery.
- Hospital characteristics, payer source, and elective induction of labor are identified as non-medical determinants predictive of cesarean birth in more than half of the studies reviewed.
- Low-risk childbearing women are a vulnerable population, exhibiting greater unwarranted variations in cesarean birth than women with medical risk factors.

INTRODUCTION

Unwarranted care variations in care are defined as differences in utilization of healthcare resources and services that cannot be explained on the basis of illness, patient risk factors, standards of evidenced based medicine, or patient preferences.¹ Unwarranted variations in care were first described by Dr. John Wennberg more than forty years ago within populations of Medicare beneficiaries.² There are three types of unwarranted variation: effective care variation, preference-sensitive variation, and supply-sensitive variation (Table 2.1).¹ Effective care variations occur when evidence-based practices are underused (e.g., continuous labor support, doula, hydrotherapy).³ Preference-sensitive variations occur within the context of equivocal scientific knowledge whereby a provider and client can reasonably choose from two options (e.g., epidural anesthesia, induction of labor after rupture of membranes at term). In the case of preference-sensitive variations, research suggests that provider opinion and preference drive the majority of decisions in these cases, resulting in increased use of technology and increasing treatment intensity.^{4,5,6}

The third type of variation, supply-sensitive variation, relates to changes in utilization of services based on the access to healthcare resources. These variations in care depend less on what the patient needs or wants and instead relate directly to the capacity of the environment (e.g., number of providers, types of providers, types of diagnostic tests, procedures, or insurance type). In the United States, underuse of evidence-based care, provider preference variations, and overuse of supply-sensitive care is documented.^{1,7}

To date, the framework of unwarranted variation in care has been underutilized as a tool for improving the quality for childbearing women in the United States.⁸ According to the US Department of Health Human Services, Center for Disease Control and Prevention, and National Center for Health Statistics, more than 1.2 million women giving birth annually are medically “low-risk.”⁹ Within the context of birth certificate data, *low-risk* is operationally defined as a woman giving birth for the first time when the neonate is a singleton, in the vertex presentation at term.⁹ In the United States in 1997, the cesarean rate for nulliparous women with term, singleton, vertex births was 18.7%. The latest published data demonstrates a rate of 26.9%.⁹ Between 1997 and 2009, 35 states reported increases in these rates of 50% or more.⁹ Healthy People 2020,¹⁰ the Joint Commission,¹¹ the American College of Obstetricians and Gynecologists, and the Society for Maternal-Fetal Medicine¹² have endorsed the public health aim of decreasing low-risk cesarean birth in the United States.

The following literature review examines the state of the science regarding non-medical determinants of cesarean among low-risk, childbearing women in the United States. The goal of the review is to summarize the research and identify modifiable factors to reduce over-utilization of cesarean among low-risk, childbearing women.

METHODS

Search Strategy

A literature search was performed using electronic databases including PubMed, CINAHL, Ovid MEDLINE, Google Scholar, Cochrane Database of Systematic Reviews, and ProQuest Dissertation Database. The gray literature was searched including

professional organization policy statements, quality improvement collaborative publications, and national vital statistic reports. Key words included MeSH terms: utilization review, variation, unwarranted variation, cesarean birth, episiotomy, induction of labor, and breastfeeding. Additional search terms included treatment intensity and intensity of treatment. No time frames were imposed. The search was limited to publications in English, births occurring in the United States, and availability in full text.

Criteria for Inclusion and Exclusion

Abstracts retrieved in the initial search were included if the report addressed the topic of unwarranted variation in nationally endorsed physiologic birth measures: cesarean, episiotomy, induction of labor, and breastfeeding.¹³ Bibliographies were hand-searched for additional relevant references. Due to the nature of the topic, no randomized controlled trials or qualitative studies were found.¹⁴ No books, dissertations, or policy statements met criteria. One white paper and one open sourced publication met criteria for review. The articles retrieved on the topic were published between 1991 and 2015.

A total of 593 articles were found and their abstracts were reviewed by the author; 308 publications were removed because they were not relevant to the concept of unwarranted variation; 179 articles were excluded as duplicates; and an additional 53 articles were excluded because they evaluated variations in countries other than the United States.

The remaining 53 articles were retrieved in full text, read in full, and analyzed by the author. Of these, 11 articles were excluded from further analysis because racial and ethnic disparities were the independent variables (outside the topic of this review); eight

studies were removed because they were intervention studies relating to the quality indicator rather than evaluation of unwarranted variation. A total of 34 studies remained for continued inclusion in the analysis. The literature review was then narrowed to research evaluating the single outcome measure of unwarranted variation in cesarean birth. A total of 16 publications on unwarranted variation in episiotomy, induction of labor, and breastfeeding were thus excluded at this time, leaving 18 studies on cesarean birth. Of these, nine were excluded from further analysis; eight because they did not include analysis on low-risk women as an outcome measure or subcategory of analysis and 1 because it did not include analysis of the predictors of variation. The remaining nine studies are included in this analysis. A detailed literature table was created, organizing articles thematically and chronologically to facilitate analysis of the literature.

RESULTS

Characteristics of Studies Reviewed

All nine studies included in this analysis are descriptive, correlational, exploratory, non-experimental designs (Table 2.2). Three of the studies use birth certificate data alone.^{15, 16, 17} One study used Health Care Utilization Project (HCUP) claims data,¹⁸ and one linked hospital discharge and claims data.¹⁹ Two of the studies used perinatal data registries: one prospective, institution level, perinatal dataset;²⁰ one multi-center perinatal dataset using retrospective data extraction.²¹ Two of the studies linked multiple data sets: one linked hospital birth certificate data with data from a state perinatal trust;²² one linked birth certificate, Medicaid claims data, and Health Plan Employer Data and Information Set (HEDIS) reporting.²³ The studies include data from

births occurring between 1996 through 2009. Forty-four states were represented within the data, with Arizona, California, Massachusetts, New Jersey, and New York being the subject of more than one of the publications included. Because there is overlap between state level data and national birth certificate and claims data over the 13-year time period, it is not possible to aggregate the data and write a meta-analysis of these findings.

All of the studies use detailed risk stratification methods to control for known medical and social causes of cesarean. The studies employed a variety of methodologies to analyze the data including cross tabulation, analysis of variance, as well as various regression methods to identify predictive, non-medical determinants of cesarean birth.

Supply-Sensitive Variations in Cesarean Birth

Analysis of more than 1 million births across 44 states in the years between 1996 and 2009 revealed significant unwarranted variation in cesarean birth, with non-medical determinants demonstrating strong predictive value related to increased utilization of cesarean birth among low-risk, childbearing women. The most common type of non-medical determinant of cesarean birth identified throughout the studies is supply-sensitive variation. Supply-sensitive variations are well described in the literature, and all nine studies demonstrated standard operational definitions within the analysis to determine that the utilization in cesarean was not correlated with the medical risk or needs of the populations studied. Supply-sensitive variations relate directly to the capacity of the environment, not to the needs of the client being served (e.g., number of providers, types of providers, types of diagnostic tests, procedures, and insurance type).¹ Supply-sensitive variations lead to overuse of unnecessary interventions, increasing cost and decreasing

quality. Hospital ownership (non-profit, for-profit), payer type (e.g., Medicaid, private insurance), delivery volume, and teaching status of the facility are all supply-sensitive variations demonstrated within the studies included in this analysis.

Hospital characteristics are demonstrated to be independent predictors of unwarranted variation in cesarean birth.^{18-20,22} In a study of 80,371 nulliparous, term, singleton, vertex births in 49 hospitals in Massachusetts, after controlling for known risk factors, the authors found ranges in cesarean between 14% to 38.3%, with the hospital itself being an independent risk factor for unwarranted variations.¹⁹ In 2013, Kozhimannil and colleagues demonstrated the distinct vulnerability of low-risk women to supply-sensitive, hospital-level variations.¹⁸ In their study of 817,318 births at 593 US hospitals in 2009, cesarean rates ranged nearly ten-fold (7.1%-69.9%). Among low-risk women, a fifteen-fold hospital level variance was shown within the population, demonstrating a greater vulnerability within this population as cesarean rates ranged from 2.4% and 36.4%.¹⁸

Two studies demonstrated the protective effect of being a teaching hospital on reduction of unwarranted variation,^{18,22} while one study found teaching status to be correlated with increased cesarean.²¹ Two of the studies evaluated for-profit and non-profit status of the hospitals and determined in both cases that non-profit status has a protective effect against overuse of cesarean in low-risk women.^{17,22} Other organizational characteristics demonstrated to protect against inappropriate use of cesarean included having a certified nursery, a level III nursery, and perinatal specialists on staff.²² Within studies evaluating low-risk women and unwarranted cesarean birth, only one study

evaluated the effect of institution size, birth volume, and location on outcomes. In this study, small and rural hospitals demonstrated slightly greater variation in unwarranted use of cesarean.¹⁸

In all four studies evaluating the independent effect of payer status, the insurance status of the client demonstrated significant, independent influence on unwarranted variations in cesarean among low-risk women. After controlling for medical and sociodemographic risk factors, privately insured women experienced the highest rates of unwarranted variation in cesarean birth in most of the studies. In three studies, Medicaid was demonstrated to protect against unwarranted variation in this population.^{17,22,23} The opposite was demonstrated to be true in a study of 12 research-funded clinical centers. In this sample, public insurance was an independent predictor of cesarean birth.²¹ Finally, one study evaluated utilization of prenatal care as a supply-sensitive measure indicative of access to healthcare resources. In this study, having no prenatal care demonstrated a protective effect against overutilization of cesarean.²²

Preference-Sensitive Variation in Cesarean Birth

Preference-sensitive variations occur within the context of equivocal scientific knowledge. When a client or provider can reasonably choose between options, preferences drive variations. In previous studies, providers' preference had the largest effect on these variations.⁶ Four studies in this sample evaluated preference-sensitive variations in low-risk cesarean births. Hospitals with higher induction rates are correlated with higher cesarean birth rates in all four studies.^{15,20,22,24} In one of the studies, early admission in labor as a routine practice was demonstrated to increase cesarean birth.²⁰ In

this study, 53% of the variation in nulliparous term singleton vertex cesarean birth is explained by induction and early admission in labor.

Other practice patterns indicative of provider preference included patterns of day time, weekend, and holiday variations. In the only study that evaluated this non-medical determinant, time of day was demonstrated to be an independent risk factor for cesarean.²¹ In this study, evening hour births are correlated with cesarean birth.

DISCUSSION AND IMPLICATIONS

Supply-sensitive variations in cesarean birth, specific to low-risk childbearing women have not been summarized previously within the literature. The distinct needs and vulnerability of low-risk, childbearing women to the treatment-intensive, predominant model of care within hospital settings in the United States warrants further research. Further identifying effective methods of preventing the effects of non-medical determinants that drive the overuse of cesarean birth among low-risk childbearing women will increase quality and value in the United States.

Provider Type

None of the studies evaluated midwifery as a provider type and its predictive effect on unwarranted variation. Midwifery-led care is known to decrease cesarean birth.²⁵ The lack of evaluation of attending provider type as a supply-sensitive variation and its effect on variation within this sample of studies is concerning. Attending provider is one of the variables easily accessible within birth certificate datasets, which were used in five (55%) of the studies included in this review. Validity of birth attendant type has not been established, perhaps limiting the ability to include this variable; however, no

mention of this was made in any of the studies. Attending provider type should be a high priority variable when these studies are replicated in the future, given the wealth of data on midwifery and appropriate use.²⁶⁻²⁸

Culture Management and Implementation Science Research

The studies suggested variations were a result of “hospital practices and culture,”¹⁹ “individual-, physician-, and hospital-culture factors,”²² “independent of medical indication,”¹⁵ and that “practice styles determine much of the variation.”²⁴ These findings mirror what has been found in research on unwarranted variation among Medicare beneficiaries. A national movement towards standardizing processes of care and decision-making is underway to eliminate what Clark describes as “patterns of almost random decision making.”²⁹ More research is needed to understand how to best support culture management and implementation science.

Higher Risk for Low-Risk Women

While controlling for medical and social risk, the studies demonstrate a distinct vulnerability within the population of healthy, medically low-risk childbearing women. The variation within the cohort of low-risk women is greater than for women with risk factors.^{18,24} Routine measurement and transparent reporting of low-risk cesarean birth, as endorsed by the National Quality Forum, is necessary in order to address the systems level, modifiable causes of unwarranted variation and protect low-risk women from systemic overuse and inappropriate use of intervention that causes harm. In all seven studies that evaluated the cesarean rate for nulliparous term singleton vertex births, researchers were able to use logistic regression, hierarchical regression, or other

regression techniques to definitively demonstrate that inter-hospital and regional variances are not a function of medical risk status or population factors. Rather, variation in utilization of cesarean in the low-risk childbearing population is a result of supply- and preference-sensitive factors.^{15,19-24}

Need for Expanded Datasets

Collectively, all nine studies represent a robust sample with a variety of reliable data sources. While birth certificate and discharge claims data are known to have limitations, their accuracy and reliability are high for mode of birth.^{17,30,31} Increased utilization of prospective datasets will offer increased accuracy and validity for documenting processes of care, risk factors, patient preferences and treatment intensity. The literature reviewed for this analysis did not include any patient-reported outcomes, experience of care measures, nor preference-sensitive metrics. Engaging consumers is an essential component of research evaluating unwarranted variations in care, specifically preference-sensitive variations.

Costs

Despite rigorous methodology and the inclusion of claims data in two (22%) of the studies, no information regarding the cost of unwarranted variation is reported in any of the studies. According to the latest published data, the most expensive conditions billed to Medicaid and private insurers in the United States relate to pregnancy, childbirth, and care of the newborn, totaling more than \$92 billion annually.³² Both commercial insurers and Medicaid are demonstrated to pay 50% more for cesarean births.³³ More than 59% of the costs related to childbirth are associated with the facility

fees.³³ In the studies reviewed, hospital facilities are an independent predictor of unwarranted variation in cesarean utilization. More research is needed to inform pay-for-performance policy development. Linking clinical data registries, birth certificate data, and claims data is necessary to better understand the relationships between hospital facilities as predictors of increased utilization.

In 2011, an estimated \$50 million dollars was saved in Utah when Intermountain Healthcare implemented evidence-based protocols reducing elective induction of labor from 28% to 2% across all settings, including 23 hospitals in both urban and rural settings.³⁴ Extrapolated to the national level, an estimated \$3.5 billion could be saved annually through reduction in unwarranted variation in elective induction of labor. In the same year, the California Maternal Quality Care Collaborative documented a decrease of \$80,435,876 per year for commercial and Medi-cal third-party payers in California through a reduction in harmful elective labor practices such as induction and early admission.²⁰ Similarly, in 1999, a study of 92,800 births in 78 Los Angeles County Hospitals demonstrated that an estimated \$13.6 million in Medicaid expenses could be saved per year if beneficiaries gave birth in a public teaching hospital as opposed to private, non-teaching hospitals.³⁵ In 1990, similar findings were reported in a review of 461,066 births in California over one year. The data in this sample demonstrated a potential savings to Medi-cal of \$51 million per year through a strategic reduction in non-medical cesareans.³¹ More research is needed regarding the cost of overuse in order to drive change, evidence-based payment reform, and public policy.

CONCLUSION

During the past 20 years, the framework of unwarranted variations of care has been underutilized in research regarding childbirth. Millions of healthy childbearing women give birth in the United States every year within systems characterized by overutilization of cesarean. It is projected that by 2018, the United States will spend \$4.4 trillion on healthcare annually, far exceeding other nations, while attaining poorer health outcomes than most developed countries.³² Expanding research to evaluate and improve the performance of the healthcare system for normal, healthy, childbearing women will increase quality and improve value.

REFERENCES

1. Center for the Evaluative Clinical Sciences. *Supply-sensitive care. (A Dartmouth Atlas Project Topic Brief)*. Lebanon, NH: Center for Evaluative Clinical Sciences; 2007. http://www.dartmouthatlas.org/downloads/reports/supply_sensitive.pdf. Published 1/15/2007. Accessed 6/1/2016.
2. Wennberg JE. Forty years of unwarranted variation--and still counting. *Health Policy*. 2014;114(1):1-2. doi: 10.1016/j.healthpol.2013.11.010.
3. Carter MC, Corry M, Delbanco S, et al. 2020 vision for a high-quality, high-value maternity care system. *Womens Health Issues*. 2010;20(1):S7-17.. doi: 10.1016/j.whi.2009.11.006.
4. Cassel CK, Guest JA. Choosing wisely: Helping physicians and patients make smart decisions about their care. *JAMA*. 2012;307(17):1801-1802. doi: 10.1001/jama.2012.476.
5. Fowler, Floyd J., Jr, Gallagher PM, Bynum JPW, Barry MJ, Lucas FL, Skinner JS. Decision-making process reported by Medicare patients who had coronary artery stenting or surgery for prostate cancer. *J Gen Intern Med*. 2012;27(8):911-916. doi: 10.1007/s11606-012-2009-5.
6. Fowler, Floyd J., Jr, Gerstein BS, Barry MJ. How patient centered are medical decisions?: Results of a national survey. *JAMA Intern Med*. 2013;173(13):1215-1221. doi: 10.1001/jamainternmed.2013.6172.
7. Shah N. A NICE delivery--the cross-Atlantic divide over treatment intensity in childbirth. *N Engl J Med*. 2015;372(23):2181-2183. doi: 10.1056/NEJMp1501461.
8. Sakala C, Corry MP. Achieving the institute of medicine's six aims for improvement in maternity care. *Women's Health Issues*. 2008;18(2):75-78. doi: 10.1016/j.whi.2007.12.001.
9. Osterman M, Martin J. Trends in low-risk cesarean delivery in the United States, 1990-2013. *National vital statistics reports*. 2014;63(6).
10. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Maternal, infant and child health. Healthy People.gov Web site. <https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health>. Updated 2015. Accessed March 10, 2016.
11. The Joint Commission. Specifications manual for joint commission national quality measures (v2015B2) : Perinatal care. The Joint Commission Web site.

https://manual.jointcommission.org/releases/TJC2015B2/PerinatalCare.html#Perinatal_Care_40PC_41_Initial_Patient_Population. Updated 2015. Accessed March 10, 2016.

12. Obstetric care consensus no. 1: Safe prevention of the primary cesarean delivery. *Obstet Gynecol*. 2014;123(3):693-711. doi: 10.1097/01.AOG.0000444441.04111.1d.
13. Howard E, Jolles D. Navigating the perinatal quality landscape. *J Perinat Neonatal Nurs*. 2015;29(2):116-129. doi: 10.1097/JPN.0000000000000092.
14. Lavender T, Hofmeyr GJ, Neilson JP, Kingdon C, Gyte GML. Cesarean section for non-medical reasons at term. *Cochrane Database Syst Rev*. 2012;3:CD004660. doi: 10.1002/14651858.CD004660.pub3.
15. Denk CE, Kruse LK, Jain NJ. Surveillance of cesarean section deliveries, New Jersey, 1999-2004. *Birth*. 2006;33(3):203-209.
16. Glantz JC. Rates of labor induction and primary cesarean delivery do not correlate with rates of adverse neonatal outcome in level I hospitals. *J Matern Fetal Neonatal Med*. 2011;24(4):636-642. doi: 10.3109/14767058.2010.514629.
17. Lipkind HS, Duzyj C, Rosenberg TJ, Funai EF, Chavkin W, Chiasson MA. Disparities in cesarean delivery rates and associated adverse neonatal outcomes in New York city hospitals. *Obstet Gynecol*. 2009;113(6):1239-1247. doi: 10.1097/AOG.0b013e3181a4c3e5.
18. Kozhimannil K, Law M, R., Virnig B, A. Cesarean delivery rates vary tenfold among US hospitals; reducing variation may address quality and cost issues. *Health Aff*. 2013;32(3):527-535. doi: 10.1377/hlthaff.2012.1030.
19. Cáceres I,A., Arcaya M, Declercq E, et al. Hospital differences in cesarean deliveries in Massachusetts (US) 2004-2006: The case against case-mix artifact. *PLoS One*. 2013;8(3):e57817-e57817. doi: 10.1371/journal.pone.0057817.
20. Main E, Morton C'H, D., Giuliana G, Melsop K, Gould J. Cesarean deliveries, outcomes and opportunities for change in California: Toward a public agenda for maternity care safety and quality. Palo Alto, CA: CMQCC; 2011. <https://www.cmqcc.org/resource/cesarean-deliveries-outcomes-and-opportunities-change-california-toward-public-agenda>. Accessed 6/1/16.
21. Haberman S, Saraf S, Zhang J, et al. Nonclinical parameters affecting primary cesarean rates in the United States. *Am J Perinatol*. 2014;31(3):213-222. doi: 10.1055/s-0033-1345263.

22. Coonrod DV, Drachman D, Hobson P, Manriquez M. Nulliparous term singleton vertex cesarean delivery rates: Institutional and individual level predictors. *Am J Obstet Gynecol*. 2008;198(6):694.e1-11.
23. Roohan PJ, Josberger RE, Gesten FC. Risk-adjusted primary cesarean delivery rates for managed care plans in New York state, 1998. *Matern Child Health J*. 2001;5(3):169-177.
24. Glantz J, C. Obstetric variation, intervention, and outcomes: Doing more but accomplishing less. *Birth*. 2012;39(4):286-290. doi: 10.1111/birt.12002.
25. Sandall J, Soltani H, Gates S, Shennan A, Devane D. Midwife-led continuity models versus other models of care for childbearing women. *Cochrane Database Syst Rev*. 2015;9:CD004667. doi: 10.1002/14651858.CD004667.pub4.
26. Stapleton SR, Osborne C, Illuzzi J. Outcomes of care in birth centers: Demonstration of a durable model. *J Midwifery Womens Health*. 2013;58(1):3-14. doi: 10.1111/jmwh.12003.
27. Cheyney M, Bovbjerg M, Everson C, Gordon W, Hannibal D, Vedam S. Outcomes of care for 16,924 planned home births in the united states: The midwives alliance of North America statistics project, 2004 to 2009. *J Midwifery Womens Health*. 2014;59(1):17-27. doi: 10.1111/jmwh.12172.
28. Alliman J, Phillippi JC. Maternal outcomes in birth centers: An integrative review of the literature. *J Midwifery Womens Health*. 2016;61(1):21-51. doi: 10.1111/jmwh.12356.
29. Clark SL, Belfort MA, Hankins G, Meyers JA, Houser FM. Variation in the rates of operative delivery in the united states. *Am J Obstet Gynecol*. 2007;196(6):526.e1-5.
30. Bradford HM, Cárdenas V, Camacho-Carr K, Lydon-Rochelle MT. Accuracy of birth certificate and hospital discharge data: A certified nurse-midwife and physician comparison. *Matern Child Health J*. 2007;11(6):540-8.
31. Kabir AA, Steinmann WC, Myers L, et al. Unnecessary cesarean delivery in Louisiana: An analysis of birth certificate data. *Am J Obstet Gynecol*. 2004;190(1):10..
32. Wier LM, Andrews RM. The national hospital bill: The most expensive conditions by payer, 2008: Statistical brief # 107. *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. 2006.

33. Truven Health Analytics.. *The cost of having a baby in the United States: Truven Health Analytics Marketscan Study*. Ann Arbor, MI: Truven Health Analytics; 2013. <http://transform.childbirthconnection.org/wp-content/uploads/2013/01/Cost-of-Having-a-Baby1.pdf>. Accessed 6/1/16
34. James B, C., Savitz L, A. How intermountain trimmed healthcare costs through robust quality improvement efforts. *Health Aff*. 2011;30(6):1185-1191.. doi: 10.1377/hlthaff.2011.0358.
35. Gregory KD, Ramicone E, Chan L, Kahn KL. Cesarean deliveries for Medicaid patients: A comparison in public and private hospitals in Los Angeles county. *Am J Obstet Gynecol*. 1999;180(5):1177-1184.
36. Cáceres I,A., Arcaya M, Declercq E, et al. Hospital differences in cesarean deliveries in Massachusetts (US) 2004-2006: The case against case-mix artifact. *PLoS One*. 2013;8(3):e57817-e57817. doi: 10.1371/journal.pone.0057817

Table 2.1. Non-medical Determinants of Variation: Unwarranted Variation

Type of Variation	Definition	Examples
Effective Care	Underuse of services proven to benefit patients where benefits outweigh the risks, backed by strong efficacy research	Continuous labor support, hydrotherapy, delayed cord clamping, skin-to-skin dyad care.
Preference-Sensitive	Within the context of equivocal scientific research, where two or more options for treatment are reasonable, patients' values and preferences should guide utilization rather than the healthcare system or provider preferences.	Epidural anesthesia, place of birth for low-risk women, birth attendant.
Supply-Sensitive	Overuse of supplies that are available to a community, rather than utilization based on medical needs of the population.	Number of ultrasounds, provider type, elective hospitalization for childbirth, neonatal intensive care admissions, surgical birth.

Source: Adapted from Center for the Evaluative Clinical Sciences¹

Table 2.2 Summary of Research on Unwarranted Variations in Cesarean Birth

Author	Design Dataset(s) Location Year	Sample	Statistical Analysis	Results
Caceres et al 2013 ³⁶	Descriptive, non- experimental. Pregnancy to Early Life longitudinal data system linked birth certificates to hospital discharge records. 49 hospitals. Massachusetts. 2004-2006.	80,371 nulliparous, term, vertex, singleton, vertex births. Excluded birth defects and cases missing maternal education, race, and infant birth weight data.	Multilevel logistic regression.	Range in nulliparous, term, vertex, singleton caesarean rate 14%- 38.3%. Between hospital variance 0.103 (SE 0.022)
Coonrod et al 2008 ²²	Descriptive, non- experimental. Arizona Perinatal Trust birth certificate file. 40 hospitals. Arizona. 2005.	28,863 nulliparous, term, vertex, singleton births	Binary logistic regression	Adjusting confounders did not reduce hospital level variation 0.108 (SE 0.023). Substantial variations in nulliparous, term, vertex, singleton cesarean rates among 40 hospitals, with a three-fold difference between highest and lowest institutions (10.3%- 34.2%). Non-clinical variables predicted differences. Decreased risk of cesarean was associated with no prenatal care, hospitals with more government- paid births and level 3 nurseries. Elevated risk for cesarean

Denk et al 2006 ¹⁵	Descriptive, non-experimental. State electronic birth certificate file. New Jersey. 1999-2004.	576,586 live births	Cross-tabulations Controlled for risk factors (e.g., obesity, diabetes, planned elective repeats, multiple gestation, etc.).	occurred in hospitals within the second quartile induction rate, for-profit facilities, and those with level 1 or non-certified nurseries or obstetric residency programs. Induction of labor was correlated with increases in cesarean risk.
Glantz 2011 ¹⁶	Descriptive, non-experimental. Statewide Perinatal Data System electronic birth certificate database. 10 level 1 hospitals. New York. 2004-2008.	28,883 induced births and 29,764 primary cesarean births evaluated.	Logistic regression and linear regression. Controlled for medical and demographic factors.	Variation in induction of labor (11.2-50.7%) and primary cesarean (12.4-34.3%) existed, despite the relatively low-risk status of the population. Risk adjustment made little difference in variation, indicating that practice styles are a significant driver of unwarranted variation. Positive association between induction of labor and primary cesarean. Hospitals with high intervention rates had outcomes indistinguishable from hospitals with low intervention rates (suggesting that inductions were

Haberman et al. 2014 ²¹	Descriptive, non-experimental. Consortium on Safe Labor Database. 19 US Hospitals in 9 American College of Obstetricians and Gynecologists US Districts. 2005-2007.	145,764 term, singleton, non-anomalous, vertex, live births that included labor	Poisson regression, classification and regression tree analysis	Nonclinical parameters significantly correlated with primary cesarean (births during evening hours, male provider, public insurance, nonwhite race ($P<.001$)).	occurring without medical indication).
Kozhimannil et al 2013 ¹⁸	Descriptive, non-experimental. Claims data from 1,050 hospitals in 44 states: Nationwide Inpatient Sample from Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality. 20% stratified sample of all US hospitals. 2009.	817,318 births. Term, singleton, vertex with no prior cesarean.	Secondary analysis utilized cross tabulations and interquartile ranges. Controlled for hospital bed size, teaching status, or geographic location.	Cesarean rates ranged from 7.1%-69.9%. Between hospital variation significant (2.4%-36.4%). Small and rural hospitals demonstrated slightly greater variation. Teaching hospitals demonstrated less variation.	
Lipkind et al 2009 ¹⁷	Descriptive, non-experimental New York City vital statistics data included all births to women with Medicaid or private	321,308 nulliparous, singleton births. 51,682 births occurred in public hospitals, 269,626	Multivariate and Chi-Square analysis Controlled for insurance status, hospital type, sociodemographic variables, age, race, and	Women with private insurance delivering in private hospitals experienced a 30.4% cesarean rate compared with 21.2% Medicaid patients in public hospitals (OR 1.57, 95% CI,	

Main et al 2006 ²⁰	Descriptive, non-experimental. Sutter Health First Pregnancy and Delivery clinical initiative with prospective data on all nulliparous, term, vertex, singleton births in Sutter's 25 hospitals, representing seven medical groups and over 10,000 independent practitioners. California, 2001-2003.	41,416 NTSV births.	ethnicity and known confounders of cesarean birth.	1.53-1.63). Privately insured patients had the highest overall cesarean delivery rate (30.4%), followed by patients with Medicaid delivering in private hospitals (21.2%) and Medicaid patients delivering in public hospitals (20.5%).
			Weighted linear regression analysis, Poisson model regression, and standardization.	Significant variation in nulliparous, term, vertex, singleton cesarean births (10.5%- 30.2%). Correlations between labor induction ($r = 0.57$, $P < .0001$), early labor admission ($r = 0.6$, P $< .0001$). Rates of induction and early admission predicted 53% of the variation in nulliparous, term, vertex, singleton cesarean. 25% of the hospitals had nulliparous induction and early labor admission of 60% or greater.
Roohan et al 2001 ²³	Descriptive, non-experimental New York State Department of Health Quality Assurance	7,921 Medicaid and 41,817 commercial insurance births. Excluded repeat	Bivariate analysis. Multiple logistic regression models (Hosmer-Lemeshow model)	Primary cesarean for Medicaid beneficiaries 9.5%, for commercially insured women 16.3%. Commercially insured women

Reporting Requirements, Health Plan Employer Data and Information Set, Medicaid and commercial insurance. Matched vital statistics birth file. New York. 1998.	cesarean, multiple births, non-continuous enrollment in third party payer, or missing variables of interest.	Controlled for known social and medical risk factors.	were 1.13 times more likely to experience cesarean (CI 1.02, 1.26, $P= <0.05$). No geographic variation between New York City and the rest of the state.
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Abbreviations: OR, Odds Ratio; SE, Standard Error; CI, confidence interval^a

CHAPTER III

RESULTS

THE BIRTH CENTER MODEL OF CARE AND APPROPRIATE USE AMONG CHILDBEARING MEDICAID BENEFICIARIES: EVALUATION OF CARE PROCESSES AND OUTCOMES AT STRONG START BIRTH CENTER SITES

A paper submitted to
Birth: Issues in Perinatal Care

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The journal, *Birth: Issues in Perinatal Care*, granted permission to reprint this article as a chapter for this dissertation (Appendix C).

ABSTRACT

Introduction: The purpose of this research is to evaluate variations in care among childbearing Medicaid beneficiaries enrolled at American Association of Birth Center's Center for Medicare and Medicaid Innovation Strong Start Sites between 2012 and 2014.

Methods: Secondary analysis of the American Association of Birth Center's (AABC) Perinatal Data Registry™ was conducted. Descriptive statistics, process, and outcome measures are reported for the 3136 births to Medicaid beneficiaries occurring during the study time frame. Chi square analysis, t-tests, and logistic regression evaluate the relationships between process and outcomes within the sample of 2080 women coded as low medical risk on admission in labor.

Results: Medicaid beneficiaries enrolled at AABC sites demonstrate similar socio-demographic and medical risk factors as those reported nationally. Beneficiaries giving

birth within the AABC sample experienced decreased treatment intensity while exceeding national quality benchmarks. The model demonstrates the ability to adhere to client preferences, including achieving preferred site of birth (89.6%) and infant feeding method (95.3%). Effective care included demonstrated including prenatal class attendance (81.8%), midwifery-led prenatal care (98.9%), and midwifery-led birth (84.0%). Elective hospitalization in labor is demonstrated to have an independent and significant effect on cesarean section. Women choosing home or birth center admission in labor demonstrate four times greater success with vaginal delivery than women who elect hospital admission without medical indication.

Discussion: The birth center model demonstrates high quality outcomes for childbearing Medicaid beneficiaries. More research is indicated to evaluate the model's potential impact on reducing unwarranted variations in perinatal quality.

Keywords: birthing centers, Medicaid, cesarean birth, breastfeeding, utilization.

INTRODUCTION

The birth center model has been recognized as a high quality alternative to hospitalization for healthy, childbearing women.¹⁻⁸ Recently, there has been renewed interest in birth settings and risk appropriate levels of care.⁹⁻¹¹ In 2015, The American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine published the Obstetric Care Consensus Statement, promoting risk appropriate care for child bearing women.¹¹ While the document emphasizes the importance of intensive level III and level IV care for women with medical risk factors, it does not address the lack of access to appropriate level 1 care across the United States. The consensus statement does not mention the enhanced care components of level 1 birth center care, nor the effects of unwarranted variations in quality among childbearing women of low medical risk.

Approximately 85% of childbearing women in the United States are medically low-risk.¹² The healthcare delivery system promotes higher levels of care, fueling unwarranted procedures among healthy childbearing women.¹³ The vision for high-quality, high value maternity care in the United States by 2020 has been hampered by a lack of common definitions of risk in pregnancy and variation in access to alternatives to hospitalization for Medicaid beneficiaries.^{9,14,15} In 2012, the Center for Medicare and Medicaid Innovation began Strong Start for Mothers and Newborns, a 4-year initiative to test innovative methods of improving care and outcomes for Medicaid beneficiaries, including birth centers. Data from the Strong Start grant sites provides an opportunity to evaluate appropriate levels of care for childbearing Medicaid beneficiaries.

Unwarranted variations in care are defined as differences in utilization of healthcare services within a population that cannot be explained by evidence-based standards, patient and provider preferences, or the medical risk status of the population.¹⁶ Healthy, childbearing women have demonstrated increased vulnerability to unwarranted variations in care.¹⁷ The overabundance of perinatal specialty centers and neonatal intensive care units nationwide does not match the population's need for this level of care.^{14,18} Unwarranted variations in use of services related to childbirth have been documented including induction of labor,¹⁹ episiotomy,²⁰ cesarean section,^{17,21-23} and breastfeeding initiation.²⁴⁻²⁶

Low-risk childbearing Medicaid beneficiaries are marginalized by a system poorly designed to provide level 1 care for the majority of women, often providing higher treatment intensity than required by their medical characteristics.^{13-15,27,28} The purpose of this research is to evaluate the care and outcomes of childbearing Medicaid beneficiaries enrolled at American Association of Birth Center's Center for Medicare and Medicaid Innovation Strong Start Sites between 2012 and 2014.

METHODS

Study Design

A secondary analysis of the American Association of Birth Center's Perinatal Data Registry™ (AABC PDR) was conducted. An Institutional Review Board Exemption was obtained by Texas Women's University in March 2015. Data was analyzed using the Statistical Package for the Social Sciences 24.0 (SPSS).

Setting

The AABC PDRTM is used by members of the American Association of Birth Centers and includes private business, non-profit, and community health center models. Births are conducted in a variety of settings: home, birth center, and hospital. Providers include nurse-midwives, midwives, family physicians, and obstetricians.

Instruments

The AABC PDRTM, version 3.5 is one of the largest observational, prospective, de-identified, perinatal data registries in the United States. The PDR measures 189 demographic, descriptive, and process-and-outcome indicators while adhering to the guidelines from the Agency for Healthcare Research and Quality including quality assurance mechanisms that ensure completion of data, systematic patient enrollment, minimization of loss of follow-up, and data consistency checks through verification with medical records.²⁹ The registry is reliable and valid, exceeding birth certificate capabilities with 100% consistency for 10 variables when cross-matched with two data sources.³⁰

Childbearing women sign a consent form to participate upon their first obstetric visit. Women who are lost from caseload, experience miscarriage, high-risk medical transfers, or referrals are tracked within the AABC PDR as antenatal attrition, intrapartum attrition, or postpartum lost from case load. Women who maintain care throughout the entire prenatal episode with the provider utilizing the AABC PDR are tracked at three points during the course of care using 189 variables that capture the perinatal period (antepartum, intrapartum, and postpartum).

Population and Sample

The American Association of Birth Centers convened a group of 45 birth centers to track services for Medicaid beneficiaries who consented to participate. The sample contains data from all Medicaid beneficiaries enrolled for care at AABC Strong Start sites between 2012 through 2014, including both Strong Start participants and non-participants. No participating birth centers were excluded from the sample; all sites had complete data, which is defined as having no more than 5% incomplete records. A total of 6,856 women enrolled during this time period and 3136 births occurred within 45 sites in 21 states.

Socio-Demographic Characteristics

The AABC sample has a similar socio-demographic profile compared to United States Birth Certificate data during the study time period (Table 3.1).³¹ The AABC sample is slightly younger with a higher percentage of non-Hispanic white women and a higher rate of unmarried women when compared with national data. The medical risk profile of the AABC sample is similar to national data with slightly more women in the AABC PDR having diabetes than national average.³² The sample is coded by medical risk status on admission in labor. The low-risk sample has a significantly higher percentage unmarried, non-Hispanic White, Hispanic, and Non-Hispanic Black women. Women with medical risks identified on admission were slightly younger, less educated and more likely to be unmarried.

RESULTS

Outcomes: Core Perinatal Health Indicators

Compared with nationally reported core perinatal health indicators, the Medicaid beneficiaries giving birth within the AABC Medicaid sample experience lower treatment intensity (Table 3.2).^{32,33,34} In all measures evaluated, the AABC Medicaid beneficiaries exceeded national benchmarks for perinatal quality indicators. There were no elective inductions of labor before 39 weeks within the AABC Medicaid sample of 3,136 births. Nationally, during this same time period, the range of elective induction of labor prior to 39 weeks was 2%-13%; with variation in the use of induction of labor across states, ranging from 13.8%-34.8% nationwide.³⁵ The rate of episiotomy within the AABC sample is below the national benchmark of 5%.³⁶ The nulliparous, term, vertex, cesarean rate within the AABC Medicaid births is lower than the national benchmark rate of 23.9%.³⁷

Breastfeeding among AABC PDR Medicaid beneficiaries is higher than both national benchmarks and the national rates (Table 3.2).³⁴ Women and babies cared for within the AABC Medicaid sample and the AABC low-risk sample have less use of formula among breastfed infants in the first two days of life than nationally reported data during this time (2.6%, 2.9% and 19.4% respectively). There are increased rates of exclusive breastfeeding on discharge, 18% higher than national benchmarks and 52% higher than national average during the study time period.^{34,38,39} Analysis of the breastfeeding data is limited due to the number of missing variables in the dataset.

Breastfeeding on discharge is not a mandatory variable in the AABC PDR; only 1267 cases are reported, which is 40.4% of the entire birth sample.

Use of Appropriate Level One Care

In an effort to evaluate appropriate level 1 care, the AABC Medicaid sample was coded for medical risk status on admission in labor. Women with medical or behavioral risk factors on admission in labor are excluded from the appropriate use and unwarranted variation analysis (n = 1,056). Behavioral risk factor exclusions include substance or tobacco use. Medical risk factors include chronic hypertension, diabetes, heart disease, and childhood seizure disorders. Previous cesarean birth and current pregnancy risks such as pre-eclampsia, preterm labor, cholestasis, low-lying placenta, oligohydramnios, multiple gestation, and malpresentation at term are excluded. Clinical conditions that may warrant increased use of resources are excluded (e.g., pre-labor rupture of membranes, suspected macrosomia). The remaining 2,082 childbearing women in the sample are coded as medically low-risk and appropriate for admission to the home or birth center setting on admission in labor.

Preference-Sensitive Variation

Preference-sensitive variations occur when more than one treatment option is evidence-based, and the personal values of the patient or provider drive variation.^{40,41} The majority of women demonstrated capability to achieve their birth site and infant feeding intentions (Table 3.3). Ten percent of women initiating care with the intention to give birth at home or in the birth center, required hospitalization on admission to care in labor. Another

7.5% of women were admitted to the home or birth center setting in labor and required transfer of care to the hospital setting during labor.

The birth center model demonstrates accountability to women's infant feeding preferences (Table 3.3). Significant differences in intention to breastfeed are demonstrated upon admission to prenatal care with more non-Hispanic white women planning to breastfeed than black and Hispanic women (χ^2 (1, n = 5,136) = 55.5, p = <.05, phi = .104). This racial disparity disappears during the perinatal episode of care, and by the time of discharge there are no significant differences in breastfeeding by race among women of low medical risk (M = 96.1%, X^2 (5, n = 1,271) = .05, p = .703). Half of the women who expressed an infant feeding preference other than exclusive breastfeeding on admission to care (n = 665) experienced a conversion of preference and were exclusively breastfeeding on discharge from the birth episode.

Effective Care Variation

Effective care refers to evidence based practices that all patients with the condition should receive. Variations occur in the form of underuse variations, i.e., when the healthcare delivery system does not routinely provide the evidence-based intervention.⁴² The birth center model of care demonstrates appropriate use of interventions for women of low-medical risk (Table 3.3). The care processes demonstrated within the sample are known to be distinctly different from the predominant model of care in the United States (Table 3.3).²⁸ The majority of beneficiaries experienced prenatal classes, midwifery-led care for prenatal care, labor and

birth, use of intermittent auscultation as the sole form of fetal surveillance, and non-pharmacologic pain relief.

Supply-Sensitive Variation

Supply-sensitive variations occur when use of healthcare services are driven by the community level resources, rather than the needs of the patient. This leads to overuse of resources and drives costs while decreasing quality.⁴⁰ The use of hospital facilities in this sample is less than 30%, in contrast to national data in which 98.6% of births occurred in the hospital setting.³² In the absence of medical risk factors requiring hospitalization, one-fifth of beneficiaries in the low-risk sample chose elective hospitalization in labor.. The use of physician services in this sample were low and occurred in less than 4% of all antenatal care and in 13 % of the birth process. Antenatal testing, ultrasonography, and NICU admissions also demonstrated low resource intensity.

Variation in Mode of Delivery

Cesarean birth among the AABC sample is lower than national average with notable variations. Maternal age, education, gestational age, and number of prenatal visits are not a significant factor in mode of delivery. Similar to previous studies, women giving birth vaginally are significantly more likely to be multiparous ($F(13, 2077) = 5.492, p = <.05$) and married ($\chi^2(1, n = 2078) = 5.756, p = .012$). Racial variation in cesarean birth is present within the AABC sample. Among Non-Hispanic white, nulliparous, term, singleton, vertex (NTSV) pregnancies, the cesarean rate is 6.9%, compared with Hispanic NTSV 11.1% and Black NTSV 10.8% ($\chi^2(1, n = 1972) = 49.6, p = <.05, \phi = -.16$).

Among the 2,080 AABC births coded as low-medical risk on admission in labor, 457 (22%) chose elective hospitalization. Elective hospitalization is a supply-sensitive and preference-sensitive variation within the sample and is significantly associated with cesarean section ($X^2(1, n = 2080) = .146, p = <.0005, \phi = -.146$). Controlling for known medical risk factors on admission in labor, the beneficiaries who elected hospitalization experienced a 9.0% ($n = 45$) cesarean birth, compared to home or birth center admission experiencing 2.7% cesarean birth ($n = 44$).

Of the 455 women who chose elective hospitalization in labor, 283 (62.2%) were unmarried compared with 40.8% of women choosing home and birth center admission being unmarried ($\chi^2(1, 2078) = 64.831, p = <.05, \phi = .178$). Women choosing elective hospitalization are significantly younger ($M = 27, SD 5.5$) than women choosing birth center and home admission ($M = 27.4, SD 5.3$), ($F(21, 2078) = 2.600, p = <.05$).

Predictors of Cesarean Birth

To understand the relationship between the variables related to cesarean section in this sample, logistic regression is used. The model contained five independent variables previously demonstrated within the literature and within the sample to be related to mode of delivery. Use or non-use of hydrotherapy in labor,^{43,44} continuous versus non-continuous labor support,⁴⁵ use or non-use of intermittent auscultation,⁴⁶ and elective hospitalization versus outpatient admission in labor¹ were chosen as evidence-based processes with relationships to cesarean birth. Race and parity are included in the model because they are drivers of cesarean and demonstrated statistically significant relationships within the sample.³²

The full logistical model containing all predictors was statistically significant, χ^2 (6, N = 1975) = 89.91. $p < .05$, indicating that the model is able to distinguish between Medicaid beneficiaries in the sample who have specific characteristics, or received care processes that effected mode of delivery (Table 3.4). The model as a whole explained between 4.5% to 14.9% of the variation in cesarean section and correctly classified 95.7% of the cases of cesarean birth.

As shown in Table 3.4, only two of the five independent variables made unique statistically significant contributions to the model (parity and elective hospitalization versus outpatient admission). The strongest predictor of cesarean in this sample of medically low-risk Medicaid beneficiaries is parity, with first time mothers having nearly a six times greater chance of cesarean than multiparous women. Elective hospitalization of beneficiaries was also demonstrated to have an independent and significant effect on cesarean birth with Medicaid beneficiaries of low medical risk. Low-risk women who chose outpatient admissions (planned home or birth center) were four times more likely to experience vaginal delivery. Race was not a statistically significant indicator of mode of delivery within the regression. Independent care practices such as continuous labor support or exclusive intermittent auscultation were also not predictive of cesarean birth in this sample.

DISCUSSION AND IMPLICATIONS

Previous research on the birth center model of care has been limited by generalizability of the sample.⁴⁷ Medicaid beneficiaries cared for by AABC sites demonstrate complex social risk, yet relatively low medical risk similar to national birth certificate data. The

outcomes demonstrated by the AABC Medicaid sample exceed national benchmarks. The care processes demonstrate appropriate use of evidence-based practices and accountability to client preferences. Several opportunities exist to use the AABC PDR™ to inform future Medicaid research and policy development.

Elective hospitalization of healthy, medically low-risk, childbearing women is an independent risk factor for cesarean section in this sample. Previous studies have documented the independent, supply-sensitive effect of hospital institutions on cesarean rates.^{10,17,22,48} Hospital facility charges for childbirth total \$97.4 billion and are the largest contributor to the national hospital bill.⁴⁸ During this study time period, the hospitalization of pregnant women and babies accounted for five of the 20 most expensive conditions for hospital stays covered by Medicaid.⁴⁹ Hospitals serve as an important part of the continuum of care for birth centers while at the same time functioning as an independent risk factor for low-risk women. More research is needed to understand how and why healthy women choose elective hospitalization for childbirth and to explore the cultural factors driving overuse and underuse within the hospital setting.

Racial disparity in utilization of birth centers is noted in this study. In contrast to birth certificate data, race is not independently predictive of cesarean section or bottle feeding within the AABC Medicaid sample. While there were racial disparities in intention to breastfeed on admission to prenatal care, these disparities were ameliorated during the episode of perinatal care. More research is needed to understand the

underutilization of birth centers within communities of color and the effect of the model on decreasing racial disparities.

CONCLUSION

The elective hospitalization of healthy childbearing women is an independent risk factor driving cesarean birth among Medicaid beneficiaries receiving care within AABC CMMI Strong Start sites. Comparative effectiveness research is needed to better understand the high leverage processes of care and the role of the level 1 birth center model of care for Medicaid beneficiaries.

REFERENCES

1. Fullerton JT, Severino R. In-hospital care for low-risk childbirth. comparison with results from the national birth center study. *J Nurse Midwifery*. 1992;37(5):331-340.
2. Stapleton SR, Osborne C, Illuzzi J. Outcomes of care in birth centers: Demonstration of a durable model. *J Midwifery Womens Health*. 2013;58(1):3-14. doi: 10.1111/jmwh.12003.
3. Rooks JP, Weatherby NL, Ernst EK. The national birth center study. part III--intrapartum and immediate postpartum and neonatal complications and transfers, postpartum and neonatal care, outcomes, and client satisfaction. *J Nurse Midwifery*. 1992;37(6):361-397.
4. Alliman J, Phillippi JC. Maternal outcomes in birth centers: An integrative review of the literature. *J Midwifery Womens Health*. 2016;61(1):21-51. doi: 10.1111/jmwh.12356.
5. Rooks JP, Weatherby NL, Ernst EK. The National Birth Center Study. part II--intrapartum and immediate postpartum and neonatal care. *J Nurse Midwifery*. 1992;37(5):301-330.
6. Rooks JP, Weatherby NL, Ernst EK. The National Birth Center Study. part I--methodology and prenatal care and referrals. *J Nurse Midwifery*. 1992;37(4):222-253.
7. Howell E, Palmer A, Benatar S, Garrett B. Potential Medicaid cost savings from maternity care based at a freestanding birth center. *Medicare Medicaid Res Rev*. 2014;4(3). doi: 10.5600/mmrr.004.03.a06.
8. Rooks JP, Weatherby NL, Ernst EKM, Stapleton S, Rosen D, Rosenfield A. Outcomes of care in birth centers: The national birth center study. *N Engl J Med*. 1989;321(26):1804-1811 8p.
9. Institute of Medicine (IOM) and National Research Council (NRC), ed. *An Update on Research Issues in the Assessment of Birth Settings: Workshop Summary*. Washington, DC: The National Academies Press; 2013.
10. Korst LM, Feldman DS, Bollman DL, et al. Cross-sectional survey of California childbirth hospitals: Implications for defining maternal levels of risk-appropriate care. *Am J Obstet Gynecol*. 2015;213(4):527.e1-527.e12.
11. Obstetric Care Consensus No. 2: Levels of Maternal Care. *Obstet Gynecol*. 2015;125(2):502-515. doi: 10.1097/01.AOG.0000460770.99574.9f.

12. Broussard DL, Sappenfield WB, Fussman C, Kroelinger CD, Grigorescu V. Core state preconception health indicators: A voluntary, multi-state selection process. *Matern Child Health J*. 2011;15(2):158-168. doi: 10.1007/s10995-010-0575-x.
13. Shah N. A NICE delivery--the cross-Atlantic divide over treatment intensity in childbirth. *N Engl J Med*. 2015;372(23):2181-2183.. doi: 10.1056/NEJMp1501461.
14. Carter MC, Corry M, Delbanco S, et al. 2020 vision for a high-quality, high-value maternity care system. *Womens Health Issues*. 2010;20(1):S7-17. doi: 10.1016/j.whi.2009.11.006.
15. Angood PB, Armstrong EM, Ashton D, et al. Blueprint for action: Steps toward a high-quality, high-value maternity care system. *Womens Health Issues*. 2010;20(1):S18-49. doi: 10.1016/j.whi.2009.11.007.
16. Wennberg JE. Practice variations and healthcare reform: Connecting the dots. *Health Aff (Millwood)*. 2004;Suppl Variation:VAR140-VAR144.
17. Backes Kozhlmannil K, Law M, R., Virnig B, A. Cesarean delivery rates vary tenfold among US hospitals; reducing variation may address quality and cost issues. *Health Aff*. 2013;32(3):527-535. doi: 10/1377/hlthaff.2012.1030.
18. Howell EM, Richardson D, Ginsburg P, Foot B. Deregalization of neonatal intensive care in urban areas. *Am J Public Health*. 2002;92(1):119-124.
19. Glantz JC. Labor induction rate variation in upstate New York: What is the difference? *Birth*. 2003;30(3):168-174.
20. Webb DA, Culhane J. Hospital variation in episiotomy use and the risk of perineal trauma during childbirth. *Birth*. 2002;29(2):132-136.
21. Hanley GE, Janssen PA, Greyson D. Regional variation in the cesarean delivery and assisted vaginal delivery rates. *Obstet Gynecol*. 2010;115(6):1201-1208.
22. Lavender T, Hofmeyr GJ, Neilson JP, Kingdon C, Gyte GML. Caesarean section for non-medical reasons at term. *Cochrane Database Syst Rev*. 2012;3:CD004660. doi: 10.1002/14651858.CD004660.pub3.
23. Main E, Morton C'H, D., Giuliana G, Melsop K, Gould J. *Cesarean deliveries, outcomes and opportunities for change in California: Toward a public agenda for maternity care safety and quality. A CMQCC White Paper (2011)*. California Maternal Quality Care Collaborative website. <https://www.cmqcc.org/resources-tool-kits/cmqcc-publications/white-paper-cesarean-deliveries>, Accessed January 29, 2015.

24. Kruse L, Denk CE, Feldman-Winter L, Mojta Rotondo F. Comparing sociodemographic and hospital influences on breastfeeding initiation. *Birth*. 2005;32(2):81-85.
25. Kogan MD, Singh GK, Dee DL, Belanoff C, Grummer-Strawn L. Multivariate analysis of state variation in breastfeeding rates in the United States. *Am J Public Health*. 2008;98(10):1872-1880.
26. Ryan AS, Zhou W, Gaston MH. Regional and sociodemographic variation of breastfeeding in the united states, 2002. *Clin Pediatr*. 2004;43(9):815-824.
27. Sakala C, Corry MP. Achieving the Institute of Medicine's six aims for improvement in maternity care. *Womens Health Issues*. 2008;18(2):75-78. doi: 10.1016/j.whi.2007.12.001.
28. Sakala C, Corry MP. Listening to mothers II reveals maternity care quality chasm. *J Midwifery Womens Health*. 2007;52(3):183-185.
29. Gliklich RE, Dreyer NA, Leavy MB. Registries for evaluating patient outcomes: A user's guide. AHRQ Methods for Effective Health Care. 3rd edition. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 Apr. Report No.: 13(14)-EHC111.
30. Stapleton SR. Validation of an online data registry for midwifery practices: A pilot project. *J Midwifery Womens Health*. 2011;56(5):452-460. doi: 10.1111/j.1542-2011.2011.00044.x.
31. Hamilton BE, Martin JA, Osterman MJK, Curtin SC, Matthews TJ. Births: Final data for 2014. *Natl Vital Stat Rep*. 2015;64(12):1-64.
32. Martin JA, Hamilton BE, Osterman MJ, Curtin SC, Matthews TJ. Births: Final data for 2013. *Natl Vital Stat Rep*. 2015;64(1):1-65.
33. Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, HCUPnet, *Nationwide Inpatient Sample, 1997-2008* [last publicly reported data]. AHRQ web site. <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb110.jsp>. Accessed March 15, 2016.
34. Center for Disease Control. 2014 breastfeeding report card. *Division of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion*. 2015:1.
35. Medicare hospital compare. Medicare hospital inpatient quality reporting system: July 2013-july 2014. Medicare Hospital Compare Web site.

<https://www.medicare.gov/hospitalcompare/search.html>. Updated 2016. Accessed April 24 2016, 2016.

36. The Leapfrog Group. Rate of episiotomy. The Leapfrog Group Web site. <http://www.leapfroggroup.org/ratings-reports/rate-episiotomy>. Updated 2016 April 26, 2016.

37. Healthy people 2020, maternal, infant and child health. <https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health>. Updated 2016. Accessed April 25, 2016.

38. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Maternal, infant and child health. Healthy People.gov Web site. <https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health>. Updated 2015. Accessed March 10, 2016.

39. The joint Commission: Changes to breast milk feeding performance measures PC-05a and PC5. <http://www.jointcommission.org/issues/article.aspx?Article=pJCsvX%20v90qaFH1kqHuOfZXK4vViVWgWawEj1AvLtPQ=>. Updated May 6, 2015. Accessed April 25, 2016.

40. Supply-sensitive care. *Dartmouth Atlas Project Topic Brief*. 2007. Center for Evaluative Clinical Sciences. http://www.dartmouthatlas.org/downloads/reports/supply_sensitive.pdf. Accessed March 15, 2016.

41. Preference-sensitive Care: A Dartmouth Atlas Project Topic Brief. 2007. Dartmouth Atlas Project: Center for Evaluative Clinical Sciences. :1-6. http://www.dartmouthatlas.org/downloads/reports/preference_sensitive.pdf. Accessed March 15, 2016.

42. Dartmouth Atlas Project: Center for Evaluative Clinical Sciences. Effective care: A Dartmouth atlas project topic brief. 2007:1-2. http://www.dartmouthatlas.org/downloads/reports/effective_care.pdf, accessed March 15, 2016.

43. Benfield RD. Hydrotherapy in labor. *J Nurs Scholarsh*. 2002;34(4):347-352.

44. Nutter E, Meyer S, Shaw-Battista J, Marowitz A. Waterbirth: An integrative analysis of peer-reviewed literature. *J Midwifery Womens Health*. 2014;59(3):286-319. doi: 10.1111/jmwh.12194.

45. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. *Cochrane Database of Systematic Reviews*. 2012 Oct 17;10:CD003766. doi: 10.1002/14651858.CD003766.pub4.

46. Alfirevic Z, Devane D, Gyte GM. Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.CD006066.pub2.
47. Alliman J, Phillippi JC. Maternal outcomes in birth centers: An integrative review of the literature. *J Midwifery Womens Health*. 2016;61(1):21-51. doi: 10.1111/jmwh.12356.
48. Gregory KD, Ramicone E, Chan L, Kahn KL. Cesarean deliveries for Medicaid patients: A comparison in public and private hospitals in Los Angeles county. *Am J Obstet Gynecol*. 1999;180(5):1177-1184.
49. Truven Health Analytics. The cost of having a baby in the United States. *Truven Health Analytics Market Scan Study*. 2013. <http://transform.childbirthconnection.org/wp-content/uploads/2013/01/Cost-of-Having-a-Baby-Executive-Summary.pdf>. Accessed March 15, 2016.

Table 3.1 Socio-Demographic and Medical Risk Characteristics National Birth Certificate Data and the American Association of Birth Centers Medicaid Sample

	National Data n (%)	ALL AABC PDR Medicaid Births n=3,136 n (%)	AABC Births Low Medical Risk on Admission n=2,080 n (%)	AABC Births with Medical Risk Factors on Admission n=1056 n (%)	Statistical comparisons AABC low medical risk and medical risk groups
Socio-Demographic Characteristics					
Age	28.2	26.7 (5.4)	26.9 (5.4)	26.3 (5.3)	*t (3134)=-2.7, P= <.005 (95% CI:
Race/ Ethnicity					
Non-Hispanic White	2,146,482 (53.8%)	2054 (65.5%)	1288(61.9%)	766 (72.5%)	* χ^2 (1,n=3136)=34.5, P=<.001, phi= .106
Hispanic	914,116(22.9%)	684 (21.7%)	513 (24.7%)	171 (16.2%)	* χ^2 (1,n=3136)=28.9, P=<.001, phi=-.097
Non-Hispanic Black	589,016 (14.7%)	240 (7.7%)	176 (8.5%)	64 (6.1%)	* χ^2 (1,n=3136)= 5.4, P= .020, phi=-.043
American Indian or Alaskan Native	44,932 (1.1%)	30 (0.9%)	21 (1.0%)	9 (0.01%)	χ^2 (1,n=3136)= .055, P=.82,
Asian or Pacific Islander	282,724 (7.0%)	48 (1.5%)	32 (1.5%)	16 (.02%)	χ^2 (1,n=3136)=0, P=1.0
Marital Status Unmarried	40.6%	1609 (51.3%)	946 (45.5%)	663 (62.8%)	* χ^2 (1,n=3136)= 83.3, P=<.001, Phi= .164
Educational Status	---	13.1 (2.7)	13.2 (2.8)	12.7 (2.4)	*t (3133)= -4.45, p=<.001

Medical Risk Factors				
Diabetes during pregnancy	235,484 (5.9%)	219 (6.9%)	0	219 (20.7%)
Hypertension, pregnancy-associated	189,441 (4.8%)	114 (3.6%)	12 (0.06%)	173 (16.4%)
Hypertension, chronic	60,391 (1.5%)	18 (0.5%)	0	18 (1.7%)
				-

Table 3.2 Perinatal Quality Indicators

Perinatal Quality Indicator	National Data %	AABC PDR All Medicaid Births n=3,136 n (%)	AABC PDR Low Medical Risk n=2,082 n (%)
Total Induction of Labor ^a	23.0%	398 (12.6%)	91 (4.3%)
Total Cesareans	32.7%	305 (9.7%)	89 (4.2%)
Nulliparous Term Vertex Singleton Cesarean ^a	26.9%	176 (14.1%)	69 (8.5%)
Episiotomy ^b	16.2%	58 (2.6%)	35 (2.2%)
Ever Breastfed ^c	79.2%	1,821 (95.3%)	1,225 (96.0%)
Exclusive Breastfeeding on Discharge ^c	41.5%	1,769 (92.7%)	Q

Source: ^aMartin Hamilton, 2013³²; ^bAHRQ, 2011³³; ^cCenter for Disease Control, 2014³⁴

Table 3.3 Preference-Sensitive, Effective Care, and Supply Sensitive Variations in Care^a

Preference-Sensitive Variables			
Preferred Birth Site			
	Intended Place of Birth n (%)	First Site of Admission n (%)	Site of Birth n (%)
Birth center	1714 (82.3%)	1561 (75.0%)	1409 (67.7%)
Home	46 (2.2%)	63 (3.0%)	59 (2.8%)
Hospital	240 (11.5%)	458 (21.9%)	614 (29.4%)
Preference for Infant Feeding			
	Infant Feeding Intention n (%)		Infant Feeding Outcome n (%)
Breast	1421 (95.9%)		1189 (85.3%)
Combination	41 (2.7%)		35 (2.5%)
Formula	19 (1.2%)		169 (12.1%)
Effective Care Variables			
	Variable		n (%)
Prenatal Classes	Attended Class		1704 (81.8%)
Primary attendant for prenatal care	Nurse-midwife/certified midwife		1797 (86.3%)
	Certified professional midwife or licensed midwife		262 (12.6%)
	Physician		19 (0.9%)
Primary attendant for birth	Nurse-midwife/certified midwife		1538 (73.9%)
	Certified professional midwife or licensed midwife		210 (10.1%)
	Physician		274 (13.1%)
Support in labor	Nurse-midwife/certified midwife		1375 (66.0%)

	Certified professional midwife or licensed midwife	228 (11.0%)
	Physician	130 (6.2%)
	Nurse	845 (40.6%)
	Doula	293 (14.1%)
	Birth Assistant	167 (8.0%)
Fetal surveillance in labor	Intermittent auscultation only	1,210 (58.1%)
Home visits (post-partum)	Yes	906 (43.5%)
Supply-Sensitive Variables		
	Variable	n (%)
Resource Utilization	Consult with Perinatologist	78 (3.7%)
	Biophysical profile/ Amniotic Fluid Index	181 (8.7%)
	Non-stress test (prenatal)	318 (15.3%)
	Ultrasonography	1542 (74.1%)
	Elective hospitalization in labor	457 (21.9%)
	Newborn admission to NICU	25 (1.2%)

^a N = 2082.

Table 3.4 Logistic Regression Care Processes and Cesarean Birth among Women of Low Medical Risk

Factor	B	S.E.	Wald	df	Sig.	Exp (B)	95.0% CI for Odds Ratio	
							Lower	Upper
Parity	1.673	.263	40.523	1	.000	5.329	3.184	8.921
Use/no use of Hydrotherapy	.120	.330	.133	1	.716	1.128	.591	2.153
Elective Hospitalization vs outpatient admission	1.418	.340	17.414	1	.000	4.129	2.121	8.036
Use/no use of Labor support	.527	.307	2.937	1	.087	1.693	.927	3.093
Use/no use of Intermittent auscultation	-.321	.365	.773	1	.379	.726	.355	1.483
Race	.256	.233	1.2	1	.271	1.292	.819	2.040

Abbreviations: B, coefficient for constant; S.E., standard error; Wald, Chi square test; df, degree of freedom; Sig, significance; Exp(B), exponential of coefficient B; CI, confidence interval.

CHAPTER IV

CONCLUSION

Summary of the Study

The dissertation study contributed to the literature through two publications related to unwarranted variations in care among childbearing Medicaid beneficiaries. The first publication is a literature review evaluating nine studies, including over 1 million births in at least 44 states between 1996 and 2009 (Jolles, in press). Across the studies, non-medical determinants of variation including access to resources, hospital characteristics, payer source, and provider practice styles are identified as independent predictors of increased utilization of cesarean section. Women of low medical risk are identified as particularly susceptible to unwarranted variation in cesarean birth.

The second publication applies the framework of unwarranted variation to evaluate the results of care processes and outcomes for the American Association of Birth Centers, Center for Medicare, and Medicaid Innovation Strong Start sites between 2012 and 2014. In this publication, Medicaid beneficiaries receiving care at AABC Strong Start sites experienced decreased treatment intensity while exceeding national quality benchmarks. The model demonstrates preference-sensitive care variations, effective care variations, and appropriate use. Elective hospitalization is demonstrated to have an independent and significant effect on cesarean section among women of low medical risk upon admission in labor.

Summary of Findings

The aim of the literature review and secondary analysis of the AABC perinatal data registry was to evaluate the concept of unwarranted variations in care among childbearing Medicaid beneficiaries, which drive costs up and decrease value. While the concept of unwarranted variations in care has appeared in the literature for more than 40 years, the application of the framework to low-risk, childbearing families has been underutilized. Both the literature review and the results analysis synthesize the state of the science regarding the issue, function to inform future research and policy. Importantly, this is the first study that demonstrates the scalability of the birth center model among Medicaid beneficiaries. While the safety and efficacy of birth centers has been demonstrated throughout the past few decades, the studies were limited by the generalizability of the sample, primarily non-Hispanic white, privately insured women (Alliman and Phillippi, 2016; Rooks et al., 1989; Stapleton, Osborne, and Illuzzi, 2013)

Discussion

As the concept of appropriate use gains momentum in the United States, the Centers for Medicare and Medicaid Services will need to identify benchmarks for matching medical and social risk among childbearing Medicaid beneficiaries and account for the provision of the appropriate level of care. To date, the emphasis on levels of care has over-emphasized care to high-risk patients who represent the statistical minority of childbearing women (Korst et al., 2015; Obstetric care consensus no. 2: Levels of maternal care, 2015). Medicaid beneficiaries cared for within Strong Start sites provide important information to quantify social and medical risk and high leverage care

processes, which lead to high value outcomes. Because Medicaid pays for a significant number of births and newborn admissions in the United States, the issues surrounding cost, value, and quality are an urgent public policy issue (Sonchak, 2015; Torio and Moore, 2016; Xu et al., 2015).

This dissertation study confirms previous population based studies demonstrating that the majority of childbearing women are of low medical risk. The birth center model of care has been demonstrated to be safe, effective, family-centered, and aligned with the national quality strategy since 1989. More research is needed to understand the barriers preventing the model from being moved to scale and identified as the appropriate level of care for Medicaid Beneficiaries nationwide.

Conclusion

Outcomes of Medicaid Beneficiaries receiving care within the model exceed national quality benchmarks and suggest resistance to unwarranted variation.

- Effective care variations are present. The birth center model demonstrates adherence to evidence-based standards such as prenatal class attendance (81.8%), midwifery-led prenatal care (98.9%), and midwifery-led birth (84.0%).
- Preference-sensitive variations demonstrated as childbearing Medicaid beneficiaries within the sample achieved their preferred site of birth (89.6%) and infant feeding intentions (95.3%) the majority of the time.
- Supply-sensitive variations are demonstrated within the sample of Strong Start sites with the elective hospitalization of healthy, medically-low-risk women

leading to significantly more cesarean section than women choosing home or birth center admission in labor (OR 4.129, CI 95% 2.1- 8.0).

Implications for Nursing Science

More research is needed to document the exact costs and value of effective care variations produced by the model and the cost savings of appropriate use. While hospital facilities are known to be the costliest component of the perinatal episode of care, little research has examined the actual cost of overuse among Medicaid beneficiaries.

While racial disparity was not the topic of this dissertation study, important findings relating to race and outcomes are noted. Within this sample, racial disparities are noted to decrease as a result of the model throughout the perinatal episode of care. Unlike national data, race was not found to have independent, positive predictive value regarding cesarean section within the logistic regression model. Across all racial categories, there are significantly more low-risk women than high-risk women, challenging predominant assumptions of medical risk prevalence. The birth center model of care demonstrated the ability to preserve and promote health within this sample of socially high risk and medically low-risk clientele. Finally, women of color were demonstrated to succeed with breastfeeding as a result of the model of care, despite the tendency to report planning to bottle feed or do both on admission to prenatal care. This demonstrates the model's ability to promote shared decision making and consumer engagement.

Over 40 years ago, the concept of unwarranted variations in care emerged within the literature. Beginning 30 years ago and continuing today, the birth center model of

care was demonstrated to be a safe, effective, and high value alternative to intensive, medicalized childbirth in the United States (Alliman, Jolles, and Summers, 2015).

Combining the two bodies of research and moving the policy agenda forward to create a family- centered and appropriate beginning-of-life care system in the United States is a social imperative.

REFERENCES

- Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets. (2013). *National inpatient sample* (NIS), 2013. Retrieved from <http://www.ahrq.gov/research/data/hcup/index.html>, Accessed August 4 2015.
- Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, HCUPnet. (2011). *Nationwide Inpatient Sample, 1997-2008* [last publicly reported data]. Retrieved from <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb110.jsp>. Accessed March 15, 2016.
- Alfirevic, Z., Devane, D., & Gyte G.M. (2013). Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour. *Cochrane Database of Systematic Reviews*. May 2013, 31(5). doi: 10.1002/14651858.CD006066.pub2
- Alliman, J., Jolles, D., & Summers, L. (2015). The innovation imperative: Scaling freestanding birth centers, Centering Pregnancy, and midwifery-led maternity health homes. *Journal of Midwifery & Women's Health*, 60(3), 244-249. doi:10.1111/jmwh.12320

Alliman, J., & Phillippi, J. C. (2016). Maternal outcomes in birth centers: An integrative review of the literature. *Journal of Midwifery & Women's Health*, 61(1), 21-51.

doi:10.1111/jmwh.12356

American Association of Birth Centers. (2012). *AABC Perinatal Data Registry Instruction Manual*. Perkiomenville, PA: Author.

Angood, P. B., Armstrong, E. M., Ashton, D., Burstin, H., Corry, M. P., Delbanco, S. F., Salganicoff, A. (2010). Blueprint for action: Steps toward a high-quality, high-value maternity care system. *Women's Health Issues*, 20(1), S18-49.

doi:10.1016/j.whi.2009.11.007

Anthony, D. L., Herndon, M. B., Gallagher, P. M., Barnato, A. E., Bynum, J. P. W., Gottlieb, D. J., Skinner, J. S. (2009). How much do patients' preferences contribute to resource use? *Health Affairs (Project Hope)*, 28(3), 864-873.

doi:10.1377/hlthaff.28.3.864

Backes Kozhlmannil, K., Law, M., R., & Virnig, B., A. (2013). Cesarean delivery rates vary tenfold among US hospitals; reducing variation may address quality and cost issues. *Health Affairs*, 32(3), 527-535. doi:10/1377/hlthaff.2012.1030

Baicker, K., Buckles, K. S., & Chandra, A. (2006). Geographic variation in the appropriate use of cesarean delivery. *Health Affairs*, 25(5), w355-67.

Belanoff, C., McManus, B., Carle, A., McCormick, M., & Subramanian, S. (2012).

Racial/Ethnic variation in breastfeeding across the US: A multilevel analysis from the national survey of children's health, 2007. *Maternal & Child Health Journal*, 16, 14-26. doi:10.1007/s10995-012-0991-1

- Benfield, R. D. (2002) Hydrotherapy in labor. *J Nurs Scholarsh*, 34(4), 347-352.
- Bradford, H. M., Cárdenas, V., Camacho-Carr, K., & Lydon-Rochelle, M. T. (2007). Accuracy of birth certificate and hospital discharge data: A certified nurse-midwife and physician comparison. *Maternal and Child Health Journal*, 11(6), 540-8. doi:<http://dx.doi.org.ezproxy.midwives.org/10.1007/s10995-007-0178-3>
- Broussard, D. L., Sappenfield, W. B., Fussman, C., Kroelinger, C. D., & Grigorescu, V. (2011). Core state preconception health indicators: A voluntary, multi-state selection process. *Maternal and Child Health Journal*, 15(2), 158-168. doi:10.1007/s10995-010-0575-x
- Cáceres, I., A., Arcaya, M., Declercq, E., Belanoff, C. M., Janakiraman, V., Cohen, B., Subramanian, S. V. (2013). Hospital differences in cesarean deliveries in Massachusetts (US) 2004-2006: The case against case-mix artifact. *Plos One*, 8(3), e57817-e57817. doi:10.1371/journal.pone.0057817
- Carter, M. C., Corry, M., Delbanco, S., Foster, T. C., Friedland, R., Gabel, R., . . . Simpson, K. R. (2010). 2020 Vision for a high-quality, high-value maternity care system. *Women's Health Issues*, 20(1), S7-17. doi:10.1016/j.whi.2009.11.006
- Center for Disease Control National Center for Chronic Disease Prevention and Health Promotion. (2014). *Breastfeeding report card: United States 2014*. Retrieved from <https://www.cdc.gov/breastfeeding/pdf/2014breastfeedingreportcard.pdf>. Accessed March 15, 2015.
- Cheyney, M., Bovbjerg, M., Everson, C., Gordon, W., Hannibal, D., & Vedam, S. (2014). Outcomes of care for 16,924 planned home births in the United States:

- The midwives alliance of North America statistics project, 2004 to 2009. *Journal of Midwifery & Women's Health*, 59(1), 17-27. doi:10.1111/jmwh.12172
- Clark, S. L., Belfort, M. A., Hankins, G., Meyers, J. A., & Houser, F. M. (2007). Variation in the rates of operative delivery in the United States. *American Journal of Obstetrics & Gynecology*, 196(6), 526.e1-5. doi: 10.1016/j.ajog.2007.01.024
- Coonrod, D. V., Drachman, D., Hobson, P., & Manriquez, M. (2008). Nulliparous term singleton vertex cesarean delivery rates: Institutional and individual level predictors. *American Journal of Obstetrics & Gynecology*, 198(6), 694.e1-11. doi: 10.1016/j.ajog.2008.03.026
- Corallo, A. N., Croxford, R., Goodman, D. C., Bryan, E. L., Srivastava, D., & Stukel, T. A. (2014). A systematic review of medical practice variation in OECD countries. *Health Policy*, 114(1), 5-14. doi: 10.1016/j.healthpol.2013.08.002
- Dartmouth Atlas Project: Center for Evaluative Clinical Sciences. (2007). *Effective care: A Dartmouth atlas project topic brief*. Retrieved from http://www.dartmouthatlas.org/downloads/reports/effective_care.pdf, accessed March 16, 2016.
- Dartmouth Atlas Project: Center for Evaluative Clinical Sciences. (2007). *Preference-sensitive care: A Dartmouth atlas project topic brief*. Retrieved from http://www.dartmouthatlas.org/downloads/reports/preference_sensitive.pdf, accessed March 16, 2016.
- Dartmouth Atlas Project: Center for Evaluative Clinical Sciences. (2007). *Supply-sensitive care: A Dartmouth atlas project topic brief*. Retrieved from

http://www.dartmouthatlas.org/downloads/reports/supply_sensitive.pdf, accessed March 16, 2016.

Denk, C. E., Kruse, L. K., & Jain, N. J. (2006). Surveillance of cesarean section deliveries, New Jersey, 1999-2004. *Birth (Berkeley, Calif.)*, 33(3), 203-209.

Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2015). Maternal, infant and child health. Retrieved from <https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health>

Fowler, F. J., Gallagher, P. M., Bynum, J. P. W., Barry, M. J., Lucas, F. L., & Skinner, J. S. (2012). Decision-making process reported by Medicare patients who had coronary artery stenting or surgery for prostate cancer. *Journal of General Internal Medicine*, 27(8), 911-916. doi:10.1007/s11606-012-2009-5

Fowler, F. J., Gerstein, B. S., & Barry, M. J. (2013). How patient centered are medical decisions? Results of a national survey. *JAMA Internal Medicine*, 173(13), 1215-1221. doi:10.1001/jamainternmed.2013.6172

Fullerton, J. T., & Severino, R. (1992). In-hospital care for low-risk childbirth. comparison with results from the national birth center study. *Journal of Nurse-Midwifery*, 37(5), 331-340.

Glantz, J. C. (2011). Rates of labor induction and primary cesarean delivery do not correlate with rates of adverse neonatal outcome in level I hospitals. *The Journal of Maternal-Fetal & Neonatal Medicine: The Official Journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal*

Societies, the International Society of Perinatal Obstetricians, 24(4), 636-642.

doi:10.3109/14767058.2010.514629

Glantz, J. C. (2012). Obstetric variation, intervention, and outcomes: Doing more but accomplishing less. *Birth (Berkeley, Calif.)*, 39(4), 286-290.

doi:10.1111/birt.12002

Gliklich, R.E., Dreyer, N.A., & Leavy, M. B. (2014) Registries for evaluating patient outcomes: A user's guide. AHRQ Methods for Effective Health Care. 3rd edition. Rockville (MD): Agency for Healthcare Research and Quality; Report No.: 13(14)-EHC111.

Goer, H., & Romano, A. (2012). Optimal care in childbirth: The case for a physiologic approach. Seattle, WA: Classic Day Publishing.

Gregory, K. D., Ramicone, E., Chan, L., & Kahn, K. L. (1999). Cesarean deliveries for Medicaid patients: A comparison in public and private hospitals in Los Angeles County. *American Journal of Obstetrics and Gynecology*, 180(5), 1177-1184.

Haberman, S., Saraf, S., Zhang J., Landy, H.J., Branch, D.W., Burkman, R., ... Von Gruenigen, V. (2014). Nonclinical parameters affecting primary cesarean rates in the United States. *American Journal of Perinatology*, 31(3):213-222. doi: 10.1055/s-0033-1345263.

Hamilton, B. E., Martin, J. A., Osterman, M. J. K., Curtin, S. C., & Matthews, T. J. (2015). Births: Final data for 2014. *National Vital Statistics Reports: From the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System*, 64(12), 1-64.

- Hanley, G. E., Janssen, P. A., & Greyson, D. (2010). Regional variation in the cesarean delivery and assisted vaginal delivery rates. *Obstetrics & Gynecology*, 115(6), 1201-1208. doi:10.1097/AOG.0b013e3181dd918c
- Hassmiller, S. B., & Goodman, D. C. (2011). Interprofessional care and the future of nursing. *Journal of Interprofessional Care*, 25(3), 163-164. doi:10.3109/01460862.2011.557903
- Hodnett, E. D., Gates, S., Hofmeyr, G. J., & Sakala, C. Continuous support for women during childbirth. *Cochrane Database of Systematic Reviews*. 2013(7) 1-118. doi:10.1002/14651858.CD003766.pub5
- Howard, E., & Jolles, D. (2015). Navigating the perinatal quality landscape. *The Journal of Perinatal & Neonatal Nursing*, 29(2), 116-129. doi:10.1097/JPN.0000000000000092
- Howell, E. M., Richardson, D., Ginsburg, P., & Foot, B. (2002). Deregionalization of neonatal intensive care in urban areas. *American Journal of Public Health*, 92(1), 119-124.
- Howell, E., Palmer, A., Benatar, S., & Garrett, B. (2014). Potential Medicaid cost savings from maternity care based at a freestanding birth center. *Medicare & Medicaid Research Review*, 4(3) doi:10.5600/mmrr.004.03.a06
- Institute of Medicine. (2010). The Healthcare Imperative: Lowering Costs and Improving Outcomes: Workshop series summary. Washington DC: National Academy Press.

- Institute of Medicine (IOM) and National Research Council (NRC) (Ed.). (2013). *An update on research issues in the assessment of birth settings: Workshop summary*. Washington, DC: The National Academies Press.
- James, B., C., & Savitz, L., A. (2011). How intermountain trimmed health care costs through robust quality improvement efforts. *Health Affairs*, 30(6), 1185-1191. doi:10.1377/hlthaff.2011.0358
- Jolles, D. (2013). "Unwarranted variations in quality of care to childbearing Medicaid beneficiaries in the United States." Poster Presentation. 58th Annual Meeting and Exposition. The American College of Nurse-Midwives, Nashville TN, May 29-June, 2013.
- Jolles, D. (in press). Unwarranted variation in utilization of cesarean section among low-risk childbearing women. *Journal of Midwifery and Women's Health*. doi: 10/1111k,wj/12565.
- Kabir, A. A., Steinmann, W. C., Myers, L., Khan, M. M., Herrera, E. A., Yu, S., & Jooma, N. (2004). Unnecessary cesarean delivery in Louisiana: An analysis of birth certificate data. *American Journal of Obstetrics and Gynecology*, 190(1), 10.
- Kogan, M. D., Singh, G. K., Dee, D. L., Belanoff, C., Grummer-Strawn, L. (2008) Multivariate analysis of state variation in breastfeeding rates in the United States. *American Journal of Public Health*, 98(10), 1872-1880. doi: 10.2105/AJPH.2007.127118
- Korst, L. M., Feldman, D. S., Bollman, D. L., Fridman, M., El, H. I., Fink, A., & Gregory, K. D. (2015). Cross-sectional survey of California childbirth hospitals:

- Implications for defining maternal levels of risk-appropriate care. *American Journal of Obstetrics and Gynecology*, 213(4), 527.e1-527.e12.
doi:10.1016/j.ajog.2015.07.014
- Korst, L. M., Feldman, D. S., Bollman, D. L., Fridman, M., El, H. I., Fink, A., . . . Gregory, K. D. (2015). Variation in childbirth services in California: A cross-sectional survey of childbirth hospitals. *American Journal of Obstetrics and Gynecology*, 213(4), 523.e1-523.e8. doi:10.1016/j.ajog.2015.08.013
- Kozhimannil, K., Law, M., R., & Virnig, B., A. (2013). Cesarean delivery rates vary tenfold among US hospitals; reducing variation may address quality and cost issues. *Health Affairs*, 32(3), 527-535. doi:10/1377/hlthaff.2012.1030
- Kruse, L., Denk, C. E., Feldman-Winter, L., & Mojta Rotondo, F. (2005). Comparing sociodemographic and hospital influences on breastfeeding initiation. *Birth: Issues in Perinatal Care*, 32(2), 81-85. doi: 10.1111/j.0730-7659.2005.00349.x
- Lallemant, N.C. (2012) Health Policy Brief: Reducing Waste in Health Care” *Health Affairs*, December 13, 2102. Retrieved from
http://healthaffairs.org/healthpolicybriefs/brief_pdfs/healthpolicybrief_82.pdf.
Accessed May 16, 2016.
- Laughon, S. K., Zhang, J., Grewal, J., Sundaram, R., Beaver, J., & Reddy, U. M. (2012). Induction of labor in a contemporary obstetric cohort. *American Journal of Obstetrics & Gynecology*, 206(6), 486.e1-9. doi: 10.1016/j.ajog.2012.03.014

- Lavender, T., Hofmeyr, G. J., Neilson, J. P., Kingdon, C., & Gyte, G. M. L. (2012).
Caesarean section for non-medical reasons at term. *The Cochrane Database of Systematic Reviews*, 3, CD004660. doi:10.1002/14651858.CD004660.pub3
- Lipkind, H. S., Duzyj, C., Rosenberg, T. J., Funai, E. F., Chavkin, W., & Chiasson, M. A. (2009). Disparities in cesarean delivery rates and associated adverse neonatal outcomes in new york city hospitals. *Obstetrics and Gynecology*, 113(6), 1239-1247. doi:10.1097/AOG.0b013e3181a4c3e5
- MacDorman, M. F., PhD, Declercq, E., PhD, & Zhang, Jun, MD, PhD. (2010). Obstetrical intervention and the singleton preterm birth rate in the United States from 1991-2006. *American Journal of Public Health*, 100(11), 2241-7. doi: 10.2105/AJPH.2009.180570
- Main, E. K., Moore, D., Farrell, B., Schimmel, L. D., Altman, R. J., Abrahams, C., . . . Sterling, J. (2006). Is there a useful cesarean birth measure? Assessment of the nulliparous term singleton vertex cesarean birth rate as a tool for obstetric quality improvement. *American Journal of Obstetrics and Gynecology*, 194(6), 1644-1651. doi: 10.1016/j.ajog.2006.03.013
- Main, E., Morton, C. Hopkins, D., Giuliana, G., Melsop, K., & Gould, J. (2011). *Cesarean deliveries, outcomes and opportunities for change in California: Toward a public agenda for maternity care safety and quality. A CMQCC White Paper*. Retrieved from <https://www.cmqcc.org/resources-tool-kits/cmqcc-publications/white-paper-cesarean-deliveries>. Accessed January 29, 2015.

- Markus, A. R., Andres, E., West, K. D., Garro, N., & Pellegrini, C. (2013). Medicaid covered births, 2008 through 2010, in the context of the implementation of health reform. *Women's Health Issues: Official Publication of the Jacobs Institute of Women's Health*, 23(5), e273-e280. doi:10.1016/j.whi.2013.06.006
- Martin, J. A., Hamilton, B. E., Osterman, M. J., Curtin, S. C., & Matthews, T. J. (2015). Births: Final data for 2013. *National Vital Statistics Reports: From the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System*, 64(1), 1-65.
- Martis, R., Emilia, O., & Nurdianti, D. S. (2010). Intermittent auscultation (IA) of fetal heart rate in labour for fetal well-being. *Cochrane Database of Systematic Reviews*, 2010(9), 1-11. doi:10.1002/14651858.CD008680
- Medicare Hospital Compare. Medicare hospital inpatient quality reporting system: July 2013-July 2014. (2016). Retrieved from <https://www.medicare.gov/hospitalcompare/search.html>
- National Quality Forum. (2012). *Perinatal and Reproductive Health Endorsement Maintenance Technical Report*. Retrieved from http://www.qualityforum.org/Publications/2012/06/Perinatal_and_Reproductive_Health_Endorsement_Maintenance.aspx, accessed May 16 2012.
- Nutter, E., Meyer, S., Shaw-Battista, J., & Marowitz, A. (2014). Waterbirth: An integrative analysis of peer-reviewed literature. *Journal of Midwifery & Women's Health*, 59(3), 286-319. doi:10.1111/jmwh.12194

Obstetric care consensus no. 1: Safe prevention of the primary cesarean delivery. (2014).

Obstetrics and Gynecology, 123(3), 693-711.

doi:10.1097/01.AOG.0000444441.04111.1d

Obstetric care consensus no. 2: Levels of maternal care. (2015). *Obstetrics and*

Gynecology, 125(2), 502-515. doi:10.1097/01.AOG.0000460770.99574.9f

Osterman, M., & Martin, J. (2014). *Trends in low-risk cesarean delivery in the United States, 1990-2013*. Retrieved from

https://www.cdc.gov/nchs/data/nvsr/nvsr63/nvsr63_06.pdf. Accessed March 15, 2015.

Roman, L., Raffo, J. E., Zhu, Q., & Meghea, C. I. (2014). A statewide Medicaid

enhanced prenatal care program: Impact on birth outcomes. *JAMA Pediatrics*, 168(3), 220-227. doi:10.1001/jamapediatrics.2013.4347

Roohan, P. J., Josberger, R. E., & Gesten, F. C. (2001). Risk-adjusted primary cesarean delivery rates for managed care plans in New York state, 1998. *Maternal and Child Health Journal*, 5(3), 169-177.

Rooks, J. P., Weatherby, N. L., & Ernst, E. K. (1992). The national birth center study.

part III--intrapartum and immediate postpartum and neonatal complications and transfers, postpartum and neonatal care, outcomes, and client satisfaction. *Journal of Nurse-Midwifery*, 37(6), 361-397.

Rooks, J. P., Weatherby, N. L., & Ernst, E. K. (1992). The national birth center study.

part II--intrapartum and immediate postpartum and neonatal care. *Journal of Nurse-Midwifery*, 37(5), 301-330.

- Rooks, J. P., Weatherby, N. L., & Ernst, E. K. (1992). The national birth center study. part I--methodology and prenatal care and referrals. *Journal of Nurse-Midwifery*, 37(4), 222-253.
- Rooks, J. P., Weatherby, N. L., Ernst, E. K. M., Stapleton, S., Rosen, D., & Rosenfield, A. (1989). Outcomes of care in birth centers: The national birth center study. *New England Journal of Medicine*, 321(26), 1804-1811 8p.
- Ryan, A. S., Zhou, W., & Gaston, M. H. (2004). Regional and sociodemographic variation of breastfeeding in the United States, 2002. *Clinical Pediatrics*, 43(9), 815-824.
- Sakala, C., Corry, M. P. (2007). Listening to mothers II reveals maternity care quality chasm. *Journal of Midwifery and Women's Health*, 52(3), 183-185. doi: 10.1016/j.jmwh.2007.03.011
- Sakala, C., & Corry, M. P. (2008). Achieving the institute of medicine's six aims for improvement in maternity care. *Women's Health Issues: Official Publication of the Jacobs Institute of Women's Health*, 18(2), 75-78. doi:10.1016/j.whi.2007.12.001
- Sandall, J., Soltani, H., Gates, S., Shennan, A., & Devane, D. (2015). Midwife-led continuity models versus other models of care for childbearing women. *The Cochrane Database of Systematic Reviews*, 9, CD004667. doi:10.1002/14651858.CD004667.pub4

- Shah, N. (2015). A NICE delivery--the cross-Atlantic divide over treatment intensity in childbirth. *The New England Journal of Medicine*, 372(23), 2181-2183.
doi:10.1056/NEJMp1501461
- Sonchak, L. (2015). Medicaid reimbursement, prenatal care and infant health. *Journal of Health Economics*, 44, 10-24. doi:10.1016/j.jhealeco.2015.08.008
- Stapleton, S. R. (2011). Validation of an online data registry for midwifery practices: A pilot project. *Journal of Midwifery & Women's Health*, 56(5), 452-460.
doi:10.1111/j.1542-2011.2011.00044.x
- Stapleton, S. R., Osborne, C., & Illuzzi, J. (2013). Outcomes of care in birth centers: Demonstration of a durable model. *Journal of Midwifery & Women's Health*, 58(1), 3-14. doi:10.1111/jmwh.12003
- The Joint Commission. (2015). Specifications manual for joint commission national quality measures (v2015B2) : Perinatal care. Retrieved from
https://manual.jointcommission.org/releases/TJC2015B2/PerinatalCare.html#Perinatal_Care_40PC_41_Initial_Patient_Population
- The Leapfrog Group. (2016). Rate of episiotomy. Retrieved from
<http://www.leapfroggroup.org/ratings-reports/rate-episiotomy>
- Torio, C., & Moore, B. (2016). National inpatient hospital costs: The most expensive conditions by payer, 2013. HCUP statistical brief #204. May 2016. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb204-most-expensive-hospital-conditions.pdf>.

- Truven Health Analytics. (2013) *The cost of having a baby in the United States: Truven Health Analytics Marketscan Study*. Ann Arbor, MI: Truven Health Analytics; Retrieved from <http://transform.childbirthconnection.org/wp-content/uploads/2013/01/Cost-of-Having-a-Baby1.pdf>. Accessed 6/1/16
- Webb, D. A., & Culhane, J. (2002). Time of day variation in rates of obstetric intervention to assist in vaginal delivery. *Journal of Epidemiology and Community Health*, 56(8), 577-8.
- Wennberg, J. E. (2011). Time to tackle unwarranted variations in practice. *BMJ*, 342, 687. doi:10.1136/bmj.d1513
- Wennberg, J. E. (2014). Forty years of unwarranted variation--and still counting. *Health Policy (Amsterdam, Netherlands)*, 114(1), 1-2. doi:10.1016/j.healthpol.2013.11.010
- Wier, L. M., & Andrews, R. M. (2006). The national hospital bill: The most expensive conditions by payer, 2008: Statistical brief # 107. *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*.
- Xu, X., Gariepy, A., Lundsberg, L. S., Sheth, S. S., Pettker, C. M., Krumholz, H. M., & Illuzzi, J. L. (2015). Wide variation found in hospital facility costs for maternity stays involving low-risk childbirth. *Health Affairs (Project Hope)*, 34(7), 1212-1219. doi:10.1377/hlthaff.2014.1088

APPENDIX A
IRB EXEMPTION



Institutional Review Board
Office of Research
6700 Fannin, Houston, TX 77030
713-794-2480
mjackson3@twu.edu
<http://www.twu.edu/irb.html>

DATE: March 9, 2015

TO: Ms. Diana R. Jolles
Nursing - Houston

FROM: Institutional Review Board - Houston

Re: *Exemption for Examination of perinatal care precesses and outcomes of childbearing Medicaid beneficiaries reported within the 2012-2014 American Association of Birth Center's Perinatal Data Registry (Protocol #: 18064)*

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and was determined to be exempt from further review.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. Because a signed consent form is not required for exempt studies, the filing of signatures of participants with the TWU IRB is not necessary.

Although your protocol has been exempted from further IRB review and your protocol file has been closed, any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All forms are located on the IRB website. If you have any questions, please contact the TWU IRB.

cc: Dr. Brenda Binder, Nursing - Houston
Dr. Rae Langford, Nursing - Houston
Graduate School

APPENDIX B

PERMISSION TO PUBLISH FROM JOURNAL OF MIDWIFERY & WOMEN'S
HEALTH

From: Diana Jolles [mailto:diana.jolles@frontier.edu]
Sent: Friday, September 23, 2016 12:20 PM
To: JMWH
Subject: Permission to publish in dissertation JMWH12565

Dear JMWH (Publisher)

I would like to deposit the full text of the following article in my dissertation to meet the graduate requirements at Texas Woman's University, Denton, Texas.

Article title: "Unwarranted Variation in Utilization of Cesarean Birth Among Low-risk Childbearing Women"

I am contacting you as a publisher in order to seek your permission to include this article as a chapter in my dissertation. The requested permission extends to any future revisions and editions of my dissertation and to the prospective publication of my dissertation by ProQuest through its UMI® Dissertation Publishing business. I would be grateful if you could return this letter (email) to me with your permission to use the aforementioned article.

Sincerely,
Diana R. Jolles

JMWH <JMWH@acnm.org>

Sep
26

to me

Hello Diana,

Yes, this is fine according to our Copyright Transfer Agreement:

3. Final Published Version. The Society hereby licenses back to the Contributor the following rights with respect to the final published version of the Contribution:

b. Re-use in other publications. The right to re-use the final Contribution or parts thereof for any publication authored or edited by the Contributor (excluding journal articles) where such re-used material constitutes less than half of the total material in such publication. In such case, any modifications should be accurately noted.

Please just make sure you include a citation for the journal article published in JMWH.

Thank you, and please let me know if you have any additional questions,

Brittany Swett
Managing Editor
Journal of Midwifery & Women's Health

JMWH Editorial Office
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Fax [\(919\) 287-2768](tel:(919)287-2768)
E-mail jmwh@acnm.org

Chapter II acceptance letter

to me

Dear Author,

Journal: Journal of Midwifery & Women's Health

Article title: "Unwarranted Variation in Utilization of Cesarean Birth Among Low-risk Childbearing Women"

Your article has been received by our production department.

Upon online publication, as corresponding author, you'll gain free access to the PDF file of the final, published article. To access the PDF, you must register at our Wiley Author Services website.

By visiting Author Services and registering now, you will also be able to enjoy the following additional benefits:

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Best wishes,

Wiley Author Services Team
12565
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APPENDIX C

PERMISSION TO PUBLISH FROM BIRTH: ISSUES IN PERINATAL CARE

From: Birth Editorial Office <BirthEditorial@wiley.com>
Date: December 13, 2016 at 7:38:14 PM EST
To: Diana Jolles <diana.jolles@frontier.edu>
Subject: FW: Reminder: Birth [email ref: AR-SW-2-a]

Dear Mrs. Jolles.

I hope this email finds you well.

In line with your concern regarding standing policy on publishing dissertation work, there is no problem if:

1. The dissertation is published prior to the Wiley article.
2. The article does not make up more than half of the published dissertation work.

If you have further questions, please do not hesitate to contact me.

Sincerely,

Ms. Ivy Fernandico
Birth Editorial Office
birtheditorial@wiley.com

From: Diana Jolles [mailto:diana.jolles@frontier.edu]
Sent: Monday, December 12, 2016 8:34 PM
To: Birth Editorial Office <BirthEditorial@wiley.com>
Subject: Re: Reminder: Birth [email ref: AR-SW-2-a]

Sep
6

Ms. Fernandico,

I am writing about this publication for two reasons.

(1) May I have an extension until January 4th? I am working with a statistician per editorial recommendation and the statistician has requested extra time due to workload during vacation season. I can resubmit without that review- or resubmit after completion of the work.

(2) Does Birth have a standing policy on publishing dissertation work. This article is one of the chapters from my dissertation (currently in the process of being published). I realize that I have not been accepted for publication in Birth, but, the University includes policies on dissertation publication from publishers in the appendix of the dissertation.

Thank you for your continued guidance.

I am eager to continue working hard to see this through publication in a timely manner.

Sincerely,

Diana R. Jolles PhD, CNM, FACNM
Course Coordinator

Birth <onbehalf+birtheditorial+wiley.com@manuscriptcentral.c

To me, me, raelangford, susanstapleton. scesario, AKoci, Jill.alliman

06-Sep-2016

Dear Mrs. Jolles:

Your manuscript entitled "The birth center model of care and appropriate use among childbearing Medicaid beneficiaries: Evaluation of care processes and outcomes at Strong Start birth center sites" by Jolles, Diana; Langford, Rae; Stapleton, Susan; Cesario, Sandra; Koci, Anne; Alliman, Jill, has been successfully submitted online and is presently being given full consideration for publication in Birth.

Co-authors: Please contact the Editor-in-Chiefial Office as soon as possible if you disagree with being listed as a co-author for this manuscript.

Your manuscript ID is Birth-16-09-05.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/birth> and edit your user information as appropriate.

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Thank you for submitting your manuscript to Birth.

Sincerely,
Birth Editorial Office