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Cesarean Births Rates After Implementation of Labor Management Guidelines

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Abstract

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BSN, University of Washington Bothell, 2006

Project Submitted in Partial Fulfillment

of Requirements for Degree of

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Abstract

Cesarean birth rates are associated with increased maternal morbidity. This project evaluated a quality improvement (QI) initiative implemented to reduce cesarean births among Nulliparous Term Singleton Vertex (NTSV) obstetric populations, the largest contributor to cesarean births. Variations in labor management practice contribute to cesarean birth rate; implementation of labor management bundles have been endorsed to influence practice- and system-level changes in the promotion of vaginal births. The problem addressed in this project was an organizational NTSV cesarean section rate of 30%. The purpose of the project was to use secondary data to evaluate a previously implemented labor management bundle at a large hospital in the northwestern United States. The model of improvement was used as a framework for the QI initiative and this evaluation project. The practice-focused question asked in this project was: Did NTSV cesarean birth rates change after implementation of an evidenced-based standardized labor management bundle? Archived data were collected on cesarean birth rates for 3 time periods: prebaseline, 1 year postimplementation, and 2 years postimplementation. Chi-square tests compared the differences between observed and expected results of data following implementation of labor management bundles. Results show no statistically significant difference between the pre- and post- implementation periods in the NTSV laboring population. Results suggest use of labor management practice bundles alone may not lead to expected outcomes improvements and that operationalization of such practices are sensitive to institutional and/or patient population contexts. This project may serve to promote positive social change by framing evidence-based practice as a process that must attend to contextual considerations.

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Dedication

I dedicate this project to my mother who has always been my cheerleader supporting my academic endeavors. Although she is no longer physically present, her love, support and encouragement remain ever present.

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Thank you Walden University for generosity in offering the doctorate of nursing nurse visionary scholarship. I will be forever grateful for the coursework and faculty that has helped me foster a deeper love and understanding for the nursing profession and the power of nursing to effect social change. I have a special appreciation for Dr. Anderson's guidance, support and commitment to academic scholarship that has helped me reach this point in my academic career. Additionally, this would not have been possible without the guidance and support of Elizabeth Pesek my mentor and colleague. Finally, my family and friends who have provided support, encouragement and patience with the process.

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Section 1: Nature of the Project

Introduction

The most common surgery performed in United States is a cesarean section, with approximately one in three babies delivered by cesarean section. The increased use of cesarean birth is associated with rise in maternal morbidity (Centers of Disease Control and Prevention [CDC], 2015). Therefore, initiatives for improving maternity care include a reduction in cesarean births, with a particular focus on the lower-risk first birth.

A consensus paper on labor management care by the Obstetric American College of Obstetrics and Gynecologists (ACOG) and the Society of Maternal–Fetal Medicine (SMFM) have recommended guidelines to reflect emerging clinical and scientific advances in labor management strategies that are predicted to decrease cesarean births (ACOG & SMFM, 2016). Researchers have discovered wide variation and gaps in labor management practices; therefore, implementation of evidence-based care bundles can be used to achieve high reliability and standardization of perinatal care (PC) aimed at improved outcomes (Arora et al., 2016; Parrotta, Riley, & Meredith, 2012; Smith, Peterson, Lagrew, Main, 2016).

Efforts to increase vaginal birth outcomes foster collaboration at the micro and macro levels. In 2015, an urban hospital in the Pacific Northwest joined the Washington State Hospital Association (WSHA) Safe Delivery Roadmap in the adoption of quality improvement project using evidenced-based labor management care bundle practices to promote vaginal births in low risk first births (WSHA, 2015). Joining a statewide initiative included the potential of harnessing the collective influence of collaborative action through cesarean reduction projects for the nulliparous term singleton vertex

(NTSV). The NTSV group is standard population that presents the most favorable set of conditions for a vaginal birth (term pregnancy, single baby with a head down presentation), but also first births have the most labor complications (Smith, Lagrew, Peterson, & Main, 2016). The NTSV obstetric population has been targeted as the largest contributor to rising cesarean rates, because the method of delivery of a first birth significant affects subsequent modes of delivery (Smith et al., 2016). Once a patient has a cesarean birth, odds are dramatically increased for another cesarean birth. Finally, data on NTSV population can be compared to between states, hospitals, and providers.

Competence in translation of research, application to practice, and evaluation of outcomes are hallmarks of the doctorate of nursing practice (DNP) terminal degree and guide improvements in practice (Association of the Colleges of Nursing [AACN], 2006). The Institute of Medicine (2010) has acknowledged nurses as leaders are positioned to lead and diffuse collaborative improvement efforts to redesign health care in the United States. Nurses are essential partners of the health care team, and an integral component for optimizing and influencing labor management practices aimed at a reduction of cesarean births.

The rising cesarean rates in the United States is an example of a critical challenge in our society in which suitable research and completion of a scholarly project may provide a positive influence for the greater good. Therefore, evaluation of a quality improvement project that used a standardized approach to incorporate evidence-based labor management bundles will assess whether a difference exists in primary cesarean sections after implementation.

Problem Statement

The problem that I addressed in this study is the rising rates of cesarean sections in the United States. The NTSV obstetric population has been targeted as the largest contributor to rising cesarean rates, because the method of delivery of a first birth significantly affects subsequent modes of delivery (Smith et al., 2016). Manifold variations in labor management practices contribute to high and variable cesarean birth rates, and implementation of best practice labor management bundles were endorsed to influence practice and system-level changes in the promotion of vaginal births. Labor management is a current area of interest for nursing, with research looking at current factors associated with cesarean birth. According to the American College of Obstetrics and Gynecology (ACOG), cesarean sections are the most common surgery in the United States, with currently 33% of women giving birth by cesarean section (ACOG, 2014). Once a patient has a cesarean birth, the odds are dramatically increased for another cesarean birth. Furthermore, U.S. society has experienced a greater than 50% increase in cesarean birth rates between 1997 and 2009 (ACOG, 2014). Cesarean rates for low-risk deliveries among hospitals vary dramatically, and most hospitals are above national targets (Haelle, 2016). My organization is a non-for-profit regional medical center that delivers approximately 4,000 babies per year, with a noted steady 30% year-to-date NTSV rate since 2014. A 30% cesarean section rate is higher than NTSV benchmark cesarean section birth rates. The Washington State and organizational benchmark goal is currently 27%, and the Healthy People 2020 goal is 23.9% (Healthy People, 2015).

Since 2014, hospitals accredited by The Joint Commission are required to publically report their cesarean rates for the low-risk first-time mothers as one of

perinatal outcomes (The Joint Commission, 2014). The outcomes measure for this study was to decrease the cesarean rate in low risk women who do not have medical indications contraindicated for a vaginal birth. Many variables contribute to cesarean birth, many of which are not evidence based, and despite the increased rates, higher rates have not improved outcomes (The Joint Commission, 2014). A wide variation of cesarean rates has been documented among hospitals depending on geographic location, but also within the same communities, and among similar institutions (Haelle, 2016).

In addition, cesarean birth poses a greater risk of maternal morbidity and mortality than vaginal birth (ACOG, 2014; CDC, 2015; Main, 2015). Multiple drivers are aimed at reduction of cesarean rates, including the collective influence of strong evidence, quality measures, data-driven quality improvement, public reporting, and payers/purchasers of health care. Strategies aimed at reducing NTSV cesarean births can support positive social change through reducing costs and improving quality. However, the goal of this quality improvement project was to safely reduce cesarean births, not to prevent cesarean births at all costs.

Purpose Statement and Project

The purpose of the project was to evaluate whether there were demonstrated differences in mode of delivery following implementation of labor management practice protocols in a large hospital in the northwestern United States. As a historical reference point in 2014, the urban Pacific Northwest hospital tested and translated evidenced-based labor care bundles into practice with the goal of standardizing care practices promoting vaginal births safely within our organization. The labor management process measures include standardization of, labor induction, first-stage, and second-stage labor practices

as a method to address gaps and variation in practice. Primary project objectives included an evaluation of unplanned cesarean births in the organization through collection of and analysis of data, and study of the degree of compliance with labor management process measures. Although the evaluation of the project included a percentage of compliance with labor management bundles, it was beyond the scope of this project to establish cause and effect. Rather, the knowledge of compliance rates provides support that labor management bundles were implemented as planned. The outcome goal of this project includes an assessment of differences between baseline NTSV cesarean sections rates and rates after completion of a performance period in which standardization of labor management was implemented. Evaluation of this scholarly project may be used to inform the evaluation of this project, and for future continued focus on quality improvement efforts targeted at safely reducing cesarean births.

Nature of Doctoral Project

I used data collected by the hospital before participation of the labor management bundles to determine whether there was a significant reduction cesarean section rates after implementation. The period of evaluation included baseline NTSV cesarean rates in 2014, and then I compared rates 1 year after implementation of labor management bundles. Although this cannot imply causality, evidence suggests that labor management can directly affect cesarean rates, with multiple sources of evidence and recommendations aimed at decreasing cesarean section rates. Sources of evidence included the Bree Collaborative, the California Maternal Quality Care Collaborative (CMQCC), and Washington State Hospital Association (WSHA) recommendations for Evidence Based Practice (EBP) labor bundles aimed at addressing large variation in labor

management practices, and cesarean rates among hospitals. Making changes in health care is a collaborative effort. My organization has been able to compare data within the institution, the States of Washington and California, through an external data center as a member of the WSHA Safe Deliveries Road Map collaboration. Real time benchmarking data was possible with participation of more than 200 hospitals representing approximately 90 percent of all births in California alone. Recognizing a gap exists in labor management, the purpose of the doctoral project was to evaluate whether my organization's cesarean birth rate significantly changed after implementation a quality improvement program. The practice-focused question that informed this doctoral project was aimed to discover whether NTSV cesarean birth rates are significantly changed after implementation of evidenced-based standardized labor management guidelines within a large northwest the hospital.

Significance

As the U.S. health care industry focuses attention toward fostering a culture of quality, safety, and value-based care, it is increasingly important for hospitals to develop and support quality initiatives, set benchmark standards for measurement, and report outcomes. Methods to improve benchmark standards in cesarean section rates include participation in quality initiatives and national reporting metrics. Federal, state, local, and hospital organizational efforts for improving PC have been implemented based on the recognition of the importance of perinatal quality outcome data to employers, purchasers, and consumers. PC-02 is a perinatal measure aimed at reduction of cesarean birth rates in the NTSV population.

Currently, 14 perinatal measures endorsed by the National Quality Forum (NQF) relate to childbirth, pregnancy, and postpartum care. The widespread adoption of five NQF endorsed PC measures have been identified as critical to improving and maintaining quality of health for uncomplicated pregnancies and births for mothers and newborns (The Joint Commission, 2015). Participating hospitals with 300 or more births per year are mandated to collect data on all five measures of the PC core measure set (The Joint Commission, 2015). PC-02 cesarean section is a measure that assesses the number of nulliparous women with a term, singleton baby in a vertex position (NTSV) delivered by cesarean section (The Joint Commission, 2012). The NTSV population has been identified the largest contributor of rising cesarean rates and, therefore, the most significant group to focus cesarean section reduction efforts on (Smith et al., 2016). PC-02 is an outcome measure with improvement noted as a decrease in the rate of cesarean births in the NTSV population.

Summary

The problem that I addressed in this project was an organizational NTSV cesarean section rate of 30%, and the rising U.S. cesarean section rates. The purpose of the project was to evaluate a quality improvement initiative in the promotion of vaginal births assessing differences in mode of delivery following implementation of labor management practice protocols in a large hospital in the northwestern United States. Although analysis focused on the low-risk NTSV population, the initiatives implemented for reducing cesarean births are generalizable to most women attempting to achieve a vaginal birth (Smith et al., 2016). The practice-focused question that informs this doctoral project was aimed to discover whether NTSV cesarean birth rates have changed following

implementation of evidenced-based standardized labor management guidelines within a large hospital in the northwest United States. Completion of the scholarly project may provide a positive influence for the greater good, and provide insightful connections in how to implement best practices for bedside care in a complex health system with continued focus on quality improvement efforts targeted at safely supporting vaginal births and reducing cesarean sections. Consideration of labor management related to mode of delivery can significantly affect practice, transparency, and shared knowledge of labor management bundle compliance, and the potential difference in cesarean birthrates is relevant to nursing practice. Reducing variation through standardization of practice patterns and adoption of evidenced-based labor practices offers a potential strategy for those who have been unable to meet the national NTSV goal of a 23.9% cesarean birth rate. Furthermore, principles of labor management in the NTSV population can be applied as a cesarean reduction strategy for all laboring patients intending vaginal births locally, nationally, and globally.

The potential positive effect of reducing cesarean births is experienced not only on an individual patient level, but also by society at large. According to the philosophy of Walden University (2011), knowledge gained is judged to be meaningful when it can positively affect the greater good of society. The rising cesarean rate in the United States is an example of a critical challenge in U.S. society that has been experienced in my organization. My organization was an early adopter of the WHSA Delivery Road Map, to address variation and a lack of standardization in labor management practices. In the past 2 years, many of the recommended best practices were implemented to confront gaps in labor management practice. Research and sharing of the journey and evaluation cesarean

birth rates following an implementation of quality improvement labor management practices is a potential reduction strategy for cesarean births.

Section 2: Background and Context

Introduction

Recognizing that cesarean births rates are above targeted benchmarks and that a gap exists in the standardization of labor management practices, I evaluated differences in NTSV cesarean birth rates following implementation of labor management practice protocols in a large urban hospital in the northwestern United States. The project question was: Has the NTSV cesarean birth rate changed following implementation of evidence-based labor management practices?

The problem that I addressed in this project included high and variable cesarean section birth rates that continue to be above the Healthy People 2020 target of 23.9%. A Consumer Reports analysis from The Leap Frog Group and the California Maternal Quality Care Collaborative (CMQCC) reported that most states have a cesarean rate that is above the national target of 23.9%, with only 40% of U.S. hospitals meeting the national target (Haelle, 2016). Wide variation is found in both overall and low-risk cesarean birth rates regionally and nationally. Rates vary 10-fold across hospitals nationally, ranging from 7.1% to 69.9%, with a 15-fold difference from 2.4% to 36.5% in the low-risk subgroup (Kozhimannil, Law, & Virnig, 2013). Variation in practice patterns and management of labor are likely drivers for the compelling disparity in cesarean rates in low-risk pregnancies and provides an impetus for adoption of an evidenced-based labor management practice model.

Many drivers and factors are related to cesarean birth rates, with minimal focus placed on research specifically designed to assess strategies to reduce cesareans.

Multiple strategies are necessary to reduce cesarean rates nationally, regionally, and locally. Changes in clinical practice of labor management offer only one composite for investigation. The practice-focused question that informed this doctoral project was aimed to discover whether NTSV cesarean birth rates changed following implementation of evidence-based labor management practices.

Concepts, Models, and Theories

Collaborative Networks

The key concept that will inform the appraisal of results evaluated were based on a process of gathering knowledge and data through collaboration, and the collective influence of partnership through a shared community vision, and evidenced-based decision-making of a multistakeholder task force focused on safe prevention of unnecessary cesarean births (WSHA, 2015). The collaborative model has been successful in other national quality initiatives for catalyzing and aligning action to collectively amplify efforts, eliminate silos, avoid duplication, and promote the adoption of best practices across public and private obstetrical quality improvement efforts (Main et al., 2012; NQF, 2012).

The strategy included participation in a network composed of a broad system of organizations concerned with current cesarean birth rates to create and sustain the pressure for change to decrease cesarean births (Smith et al., 2016). The guiding principle of the collaborative is All Teach All Learn (WSHA, 2012). The model of collaborative uses a bidirectional sharing and learning concepts with opportunities for dialog and feedback through active participation in virtual and in person meetings, and through the contribution of tools and data to track progress on quality improvement for outreach and

education at all levels of the health system (NQF, 2012; Smith et al., 2016). Results of retrospective chart review, and application of the Maternal Data Center algorithm provided monthly data on cesarean sections rates. Documented indication for cesarean birth and the percentage of compliance with labor management bundles were used to inform and drive quality improvement. Although the purpose of this study was not to evaluate the statistical significance of compliance with labor management bundles it is a method to show whether labor management bundles were implemented as intended. It was beyond the scope of this project to control for other variables that may contribute to the cesarean birth rates or establish a cause and effect.

Institute of Health Improvement Model of Improvement

A common framework for learning and improvement aimed at quality, safety, and value in my organization is based on the Institute of Healthcare Improvement (IHI) science of improvement (IHI, n.d.). The model for improvement is a framework that combines identifying a goal, formulating a theory, defining success metrics, and putting a plan into action (Deming Institute, 2016). Deming's system of profound knowledge the theory is used to understand key aspects of the system and what is needed to bring about change. The theory used includes the concepts of systems thinking, variation, theories of knowledge, and psychology (IHI, n.d.). Therefore, evaluation of the results of each process measure of the labor management bundles used the concept of systems thinking to demonstrate differences in cesarean rates as related to where in the labor process a cesarean birth occurred, what was the stated indication, and how different aspects of labor management interact and rely on each other.

I considered the concept of variation in processes and practices in evaluation of performance measures to determine areas of missed opportunities in standardization of care. I used the theory of knowledge to establish predictions about the system's performance results to determine what theories form a basis for these predictions. The component of psychology includes an understanding of the motivation for action, interactions of people within a system, and how people react to change. Program evaluation considered Deming's theory, with review of monthly audit results, use of standardized labor management practices that were compared to cesarean birth rates and ultimately the culmination of 2 years of collected data.

Measurement and Data

The data source to inform this study included patient discharge data (e.g., ICD-code), revenue code data, and core clinical data sets such as birth certificate data (e.g., gestational age) parity, plurality, presentation, and whether labor was induced or augmented with the use of a secure well established Maternal Data Center (California Maternal Quality Collaborative [CMQCC], 2013). My review includes 2 years of monthly audits, which included the identified, and coded risk stratified NTVS subgroup that had an unplanned cesarean birth, results of a labor management algorithm and percentage of compliance of labor management best practice bundles. The MDC site calculates, presents, and tracks the proportion of cases that meet the labor management bundle process measures, and cesarean birth rates are calculated collectively per total population and for each subgroup. Although it is possible to review individual cases again, data were reported as a percentage of the subgroup rather than individually.

The MDC calculates a monthly collective percentage of compliance with labor bundles as framework for sub-analysis evaluation of compliance with composites of labor management as a potential driver for cesarean section rates. Data analysis includes an evaluation of key factors of the labor management process including the percentage of induced labor and spontaneous labor NTSV rates for the Joint commission measure PC-02 = low-risk first birth NTSV cesarean birth rate. The evaluation of the project includes a percentage of compliance with labor management bundles, however it is beyond the scope of this project to establish cause and effect. Rather knowledge of compliance rates provides support that labor management bundles were implemented as planned. Additionally, it is beyond the scope of this project to control for other variables that may contribute to the cesarean birth rates or establish a cause and effect.

The quality improvement project evaluated used rapid-cycle of data as a model of improvement aimed at a reduction in variation in practice, and to inform the management of evidenced based labor practices in my organization. This included a method for timely measurement of quality improvement metrics, making data compelling to the healthcare team through rapid cycle data including baseline, benchmark, process and outcome measures data points. Data used provides evidence to inform or contradict assertions associated with cesarean rates (Smith et al, 2016). The use of the Maternal Data Center (MDC) data provides a framework of sub-analysis to understand composites of labor management as drivers for cesarean section rates, and identify main areas for focused improvement efforts. Value is attributed to the ability to report progress on the quality improvement project monthly within the department (nurses and providers) and with provider's level metrics quarterly. Therefore, the evaluation process for this doctoral

project included mining of the data to compare pre and post measures on percentage of cesarean births meeting labor management guidelines labor management in first stage and second stage of labor and the overall NTSV cesarean birth rate.

Relevance to Nursing Practice

Nurses are essential partners of the healthcare team, and an integral component for optimizing labor management practices and reduction of cesarean births. Numerous factors are associated an ever-increasing cesarean birth trend. Evidence suggests care giver practice patterns are primarily responsible for the mode of delivery, and labor nurses provide the majority of labor management practices and influence outcomes (Edmonds & Jones, 2012). Nurses are central to management of labor monitoring and assessing the health of mother and fetus throughout labor while supporting the birth process. Labor management and support includes a broad spectrum of cares (e.g., admission assessment) management of spontaneous labor, induction or augmentation of labor with oxytocin, assessment and assistance with pain management, promoting and assisting with mobility in labor, and management of the second stage of labor (Horton, 2016). Therefore, evaluation of labor management can have a significant impact on practice; through transparency and shared knowledge of labor management bundle compliance and the potential difference in cesarean birth rates as relevant to nursing practice.

Local Background and Context

The need to safely decrease cesarean rates has been identified globally, nationally, in Washington State, and locally in the northwest community where I am employed. Currently, the organization of my employment has the second highest cesarean section

rate in the state. Presently hospitals are measured against a national benchmark target rate of 23.9 %, with a target setting of a 10 % improvement, which is the Healthy People 2020 objective (Healthy People, 2015). Washington State cesarean deliveries have steadily increased from the late 1990's from 17% to 30% in 2010. However since 2011, Washington State has reported an 11% decrease NTSV rates in non-military hospitals with a reported statewide rate of 23.7% (Department of Health [DOH], 2013). Our Hospital's current year to date rate is 30%.

Role of DNP Student

My role of the DNP student includes the ability to successfully translate research findings to direct evidence based nursing practice. As an advanced practice nurse and a doctoral candidate, I have employed leadership skills, knowledge gained through a coursework towards a terminal degree, and actively participated in a multidisciplinary teams in a collaborative effort aimed at improving patient and population health outcomes to safely reduce cesarean delivery rates.

In reflection and evaluation of this evidence-based project as an advanced practice nurse, I have provided support and knowledge as needed for the project including collaboration with chief of obstetrics, physicians, nurses and members of the organization. This includes soliciting feedback from the end-users, and planning for known and anticipated education for the entire healthcare team. I have been a day to day leader, soliciting feedback driving the project forward; ensuring results of our efforts are disseminated. These levels of engagement are important steps towards a means of being able to evaluate the results of this doctoral project. Finally, data collection and analysis are essential components for the evaluation of the project. Translating results into clinical

practice is the final step in research dissemination. Findings of a quality improvement projects implemented in a clinical setting are used to inform healthcare teams once outcomes are disseminated.

The motivation for the doctoral project includes the potential for a far-reaching positive impact that is not only experienced on an individual patient level, but society at large. Furthermore I have to believe what I am doing is not only personally meaningful, but equally important for others find meaning and value in what I accomplish. Meaningful includes a significant influence for patients, colleagues, faculty and the nursing profession. According to the philosophy of Walden University (2011) knowledge gained is judged to be meaningful when it can positively impact the greater good of society. The rising cesarean rates in the United States is an example of a critical challenge in our society in which is a suitable area of research and completion of a scholarly project may provide a positive influence for the greater good.

Role of Project Team

The team of the project is comprised of multiple stakeholders affected by the local cesarean rate and includes the Director of Women and Infant Services who is an executive sponsor/project owner and ultimately has the authority over all areas affected by the project. The director ensures alignment of aims with strategic goals of the organization, and allocated project time, resources, personnel for the project to achieve the team's aim. Additionally, the team includes physician champions including the Chief of Obstetrics and selected practicing providers. Selected providers are opinion leaders and respected by their peers, desire to drive improvements in the system, and are responsible for communication of project results with medical executive committee,

perinatal joint practice, quality committees and physician peers. A clinical outcomes specialist is the project facilitator, organizing the project plan from scheduling meetings, to delegation of action items, and through collection, reporting and analysis of data. The project facilitator is a content expert in quality improvement, clinical effectiveness; evidence based practice, data collection and analysis, and works effectively with the entire project team. The project facilitator provided an essential role in the evaluation of the project. Finally, it is important to acknowledge other essential team members that include the manager of labor and delivery, charge nurses, the scheduling office, and front-line staff who directly and indirectly influenced results of the project.

Summary

Section 2 reviewed a case for change for evaluation of the results of labor management practice model established based on a national call to action to decrease cesarean sections by applying evidence to maternity care services to reduce variation and improve outcomes (Main, 2013). Opportunities for improvement include internal drivers such as a commitment to maternal child health, quality improvement, evidence -based practice, knowledge gained through gap analysis, and the potential influence of sharing the evaluation of our efforts. External drivers for evaluation of this project include mandatory perinatal core measures, and increased transparency through publically reported cesarean birth data. The approach for evaluation of this quality improvement project is based on a lack of standardization of practice in the management of labor, and the identification of changes that are likely most likely to result in improvement.

Section 3: Collection and Analysis of Evidence

Introduction

Recognizing cesarean births rates are above targeted benchmarks and higher than the majority of hospital peers combined, the purpose of doctoral project was to evaluate changes in cesarean rates in the course of a 2-year period following implementation of standardized labor management practice protocols in a large urban hospital in the northwestern United States. Specifically, I reviewed monthly collected data and analysis of the percentage of compliance with first- and second-stage labor management practices related to cesarean birth indications and rates. Although my intention was not to imply causation, I used evaluation and analysis of evidence related to the mode of delivery in conjunction with evaluation of both high and variable cesarean birth rates above national, state, and local targets. Evaluation of labor management process measures and cesarean birth data includes analysis of data collected during monthly internal reviews and external analysis using the California MDC. In Section 3, I will clarify operational definitions, explore sources of evidence, and discuss the plan for collecting and analyzing data.

Practice Focused Question(s)

The project question was: Have cesarean birth rates changed following implementation of evidenced-based standardized labor management guidelines within a large northwest the hospital?

Safe reduction of cesarean birth rates is identified as a key initiative locally, regionally, and nationally and, therefore, was the focus of this project in the organization situated in King County in the Pacific Northwest. Currently, my organization’s cesarean birth rate is higher than most local peers, with noted variation and gaps in standardization

of labor management practices. The practice-focused question that informed this doctoral project was aimed to discover whether cesarean birth rates change following implementation of evidenced-based labor management guidelines, and is aligned with the purpose of the project evaluating changes following implementation of practice evidence-based practice protocols in a inpatient hospital practice setting.

Definition of Terms

Active phase of labor: Generally beginning at 6 cm (ACOG, 2014).

Arrest of labor in the first stage: Spontaneous labor more than of equal to 6 cm dilation with membranes rupture and one of the following: 4 hours or more of adequate contractions; and 6 hours or more of inadequate contraction and no cervical change (ACOG & Society for Maternal Fetal Medicine [SMFM], 2016).

Augmentation of labor: Stimulation of uterine contractions to increase frequency and/or strength after the onset of spontaneous labor (ACOG, 2014).

Cesarean birth: Surgical procedure in which an abdominal incision is made into the uterus to deliver one of more babies (Bree Collaborative, 2012).

Elective cesarean: The decision to perform a cesarean birth for nonmedical reasons (Bree Collaborative, 2012).

Failed induction of labor: Failure to generate regular contractions (e.g., every 3 minutes) and cervical change after at least 24 hours of oxytocin administration, with artificial rupture of membranes if possible (Bree Collaborative, 2012; Spong et al., 2012).

Failure to progress in descent: When fetus does not continue to descend (Bree Collaborative, 2012).

Failure to progress in labor: When mother's cervix does not continue to dilate (Bree Collaborative, 2012).

First-stage arrest induced labor: Failure to achieve greater or equal to 6 cm dilation with membrane rupture and greater of equal to 5 cm without membrane rupture and 4 hours or more of adequate contractions 6 hours or more of inadequate contraction and no cervical change (Spong et al., 2012).

Full-term birth: Greater or equal to 37 weeks of gestation (ACOG, 2014).

Induction of labor: The decision to start labor using artificial rupture of membranes, balloons, oxytocin, prostaglandin, laminaria, or other cervical ripening agents either electively of for medical reason using methods (ACOG, 2014; Bree Collaborative, 2012).

Labor: Uterine contractions resulting in cervical change (dilation and/or effacement) (ACOG, 2014).

Latent labor: From the onset of labor to onset of active phase (ACOG, 2014).

Multiparous: A woman who has given birth more than once (ACOG, 2014).

Nulliparous: A woman who has never given birth; a parity of zero (ACOG, 2014).

Onset of labor: The time when uterine contractions began, that resulted in labor with or without the use of pharmacological and/or mechanical interventions to start labor (ACOG, 2014).

Parity: The number of pregnancies reaching 20 weeks or more, regardless of the number of fetuses or outcomes (ACOG, 2014).

Preterm birth: Infant born before 37 weeks of gestation (ACOG, 2014).

Primary cesarean birth: The first time a woman has a cesarean birth (Bree Collaborative, 2012).

Primary cesarean birth rate: The percentage of cesarean births to women who have not had a previous cesarean birth (Bree Collaborative, 2012).

Repeat cesarean: Birth by cesarean birth after previous cesarean birth (Bree Collaborative, 2012).

Repeat cesarean birth rate: The percentage of cesarean births to women who have not had a previous cesarean birth (Bree Collaborative, 2012).

Spontaneous labor: Labor without the use of pharmacological and/or mechanical interventions to start (ACOG, 2014).

Second-stage arrest: No progress descent or rotation for 4 hours or more in nulliparous women with an epidural; 3 hours or more in nulliparous women without an epidural; 3 hours or more with a multiparous woman with an epidural; 2 or more hours in multiparous women without an epidural (Spong, et al., 2012).

Singleton: Pregnancy with one fetus (ACOG, 2014).

Vertex presentation: When the fetus is presenting head first (ACOG, 2014).

Sources of Evidence

Evaluating and analyzing evidence included a review of data collected using the California Maternal Data Center (CMDC) a secure data base that was established in 2011 (CMQCC, 2013) and the results of retrospective chart review of patient information available in the Electronic Health Record (EHR). This included results from the application of a labor care algorithm that calculates compliance with all the labor management measures and provides data on overall hospital performance. The evaluation

of cesarean data collected from over two years includes indications for mode of cesarean delivery and the stage of labor when cesarean birth occurred. Additionally, the collective percentage of compliance with labor management performance measures within subgroups is included to assess if labor management bundles of the quality improvement project were implemented as intended. This method was used to objectively evaluate a quality improvement project and determine the rate of cesarean births pre and post implementation.

Archival and Operational Data

Evaluation of this project included a review of NTSV cesarean rate as a percentage of all births with the sub-categories of primary NTSV in the organization. Archival data includes cesarean rates based on diagnosis and labor management, processes or decisions that might be attributable to the rate. Evaluation of the results provides an opportunity to increase accountability for the cesarean rate, and impetus to understand a potential genesis of our rates. Evaluation of this process was possible as currently a quality improvement project and process is in place. Archival data and charts are currently reviewed as our organization is interested about potential determinants of our cesarean birth rates. The archival and operational source of cesarean birth rates and indications is based on coding, birth certificate data and use of the Maternal Data Center (MDC). Data generated provides a framework of sub-analysis evaluation to understand variations in labor management and indications for cesarean birth as a potential driver for cesarean section rates. Archival data analysis evaluated key factors of labor management including percentage of induced labor, spontaneous labor and the Joint commission measure PC-02 of the low-risk first birth NTSV (Nulliparous, Term, Singleton, and

Vertex) cesarean birth rate monthly and overtime. The ability to track and evaluate results provide insight into the problem-focused question: Have cesarean birth rates changed following implementation of evidenced based standardized labor management guidelines within a large northwest the hospital?

Evidence Generated in the Doctoral Project

While a reduction in the overall rate of cesarean birth is important, the NTSV population has accounted for the largest portion of the 50 % increase in the overall cesarean birth rate in the last decade, and accounts for greater than 90% of the variation seen among hospital primary cesarean birth rates (Main, 2013). Healthy low risk women should expect minimal interventions, normal labor, and a vaginal birth with a healthy baby. Therefore this project includes a historical evaluation of retrospective data specific to labor management bundle measures and outcomes of the Nulliparous, Term, Singleton, and Vertex (NTSV) cesarean section rate. Evaluation includes a review of organizational data and the ability to diagnose indication for mode of delivery as it relates to compliance with labor management process measures (induction and spontaneous labor practices in the first stage and second stage of labor), looking for major drivers of cesarean section rates aimed at reduction of primary cesarean births.

Published Outcomes and Research

Participation in the statewide hospital initiative provided the opportunity for this doctoral project that evaluates a quality improvement project as a reduction strategy to decrease cesarean births. While evaluating a previously implemented program cannot imply causality, there are published evidence based labor management practices recommended to decrease the risk of cesarean birth (Main, et al., 2011; Spong, et al.,

2012). In 2011, The Dr. Robert Bree Collaborative was established by legislature in order identify health services with high variation and utilization in the absence of producing better outcomes in Washington State (Bree Collaborative, 2012). The Bree Collaborative offered recommendations to improve healthcare quality, outcomes and affordability that have received approval by the Health Care Authority (Bree Collaborative, 2012). The first report in 2012 focused on obstetrics due to the high variation of unsupported practice patterns in obstetrics, including those considered attributable to primary cesarean section rates (Bree Collaborative, 2012).

In addition to unsupported variation in practice, evidence generated for this doctoral project reflects the evaluation of implementation of the best evidence as of 2014 including the executive summary for Maternal-Fetal Development, The National Institute of Child health and Human Development and the American College of Obstetricians and Gynecologists (Spong, et al., 2012), The Washington State Health Care Authority (2013), The Washington State Hospital Association [WSHA], (2013), and recommendations for safe prevention of primary cesarean birth from the ACOG and the SMFM (2014).

A summary categorized the percentage of major indications for primary cesarean section from detailed labor and delivery record of 228, 668 medical records from 19 hospitals across the United States (Zhang, et al., 2010). Included were conditions that occur prior to labor (e.g., malposition) multiple gestations, maternal request, and those that occur in labor (e.g., first stage and second stage arrest) failed induction and non-reassuring fetal heart rate; with opportunities to make the biggest effect identified in labor management (Spong et al., 2012).

Table 1

Major Indications for Primary Cesarean Delivery

	Indication	%
Prelabor	Malpresentation	10–15*
	Multiple gestation	3
	Hypertensive disorders	3
	Macrosomia	3
	Maternal request	2–8
In labor	First-stage arrest	15–30*
	Second-stage arrest	10–25
	Failed induction	10
	Non-reassuring fetal heart rate	10

*Percentage of all cesareans that have this as a primary indication.

First stage arrest (5-30%) and second stage arrest (10-20%) were the majority of indications, and therefore identified as the biggest opportunities to standardizing labor management care, including the diagnosis of labor management arrest disorders in first and second stage of labor as a prevention strategy for primary cesarean births (Spong et al., 2012). Therefore, evaluation of selected potentially modifiable obstetric indication relate to spontaneous and induction of labor management included allowing adequate time to enter and progress in labor based on standardized definitions and management of abnormal first and second stages, with a differentiation in between failed induction and arrest of spontaneous labor in the first stage (ACOG, 2014; Spong, et al., 2012). Furthermore, the adoption of well-defined criteria to be met before a cesarean is performed has the potential to decrease cesarean section (ACOG, 2014; Spong, et al., 2012). In conclusion, the quality improvement program evaluated was based on published outcomes and research related to supporting vaginal birth outcomes.

Participants

The evaluation of the quality improvement project included the use of archival data of NTSV obstetrical patients who had an unplanned cesarean birth to explore changes in cesarean section rates.

Procedures

The process included a collection of archival data of labor management process measures and ultimately the percentage of NTSV patients who had a cesarean birth with adequate time and appropriate interventions in first and second stage of labor (labor management bundles). Tools for analyzing data were based on algorithms and checklists using the best evidence available as of 2014, including the executive summary for Maternal-Fetal Development, The National Institute of Child Health and Human Development and the American College of Obstetricians and Gynecologists (Spong, et al., 2012; WSHA, 2013). Additional recommendations included the safe prevention of primary cesarean birth from the ACOG and the SMFM (2014).

The algorithms were based on objective criteria of desired best practices for labor induction, first stage of labor practices and second stage of labor management. Every month, patients with unplanned cesarean birth are identified through coding. Quality improvement team members perform chart abstraction assessing compliance with labor care algorithms within the MDC chart audit process. An attribution related the reason for cesarean birth is identified, the percentage of compliance with labor management measures is immediately calculated by MDC, with the NTSV cesarean birth rate collectively calculated per total population and each subgroup.

The quality improvement process provided the opportunity to drill down, study and analyze data to determine if labor management practices could decrease cesarean births within our organization. The evaluation process included reflecting on how our spontaneous, induced and no labor subgroups compare? What portion of our NTSV births that presented in spontaneous labor and induced labor subgroups had a diagnosis of failure to progress attributable to the cesarean birth? At what stage of labor were the majority of primary cesarean births? Based on the analysis opportunities are available to focus continued improvement efforts.

Protections

All members of the team that conduct chart abstraction and review are held accountable to HIPPA standards. Information is quality improvement protected, and all patient identifiers removed prior to sharing data. Data collection is a retrospective analysis, and therefore consent and measures to permit participants to withdraw from participation is not applicable. Therefore, data points collected within the organization as part of the Safe Deliveries Road Map and initiative to decrease cesarean births were available for evaluation of the quality improvement project.

Analysis and Synthesis

Systems for analyzing data included use of California Maternal Data Center (CMDC); a secure well established database (CMQCC, 2013) based on a retrospective chart review of all NTSV patients using the Electronic Health Record (EHR). Data was collected through a validated coding process used by the organization. The cesarean section rate is comprised of two major, mutually exclusive sub-populations (spontaneous labor resulting in cesarean birth, induced labor resulting in cesarean birth) without

fetal/maternal status concerns and/or a planned primary cesarean birth. Analysis included looking at trends in cesarean births in the NTSV laboring population examining differences in rates pre and post project intervention in each group and collectively. Additionally the rate of compliance with labor management bundles is provided.

The implemented quality improvement project (labor management bundles) was designed to reduce cesarean births in the low risk population. χ^2 Tests were used to determine if there was a statistically significant difference comparing pre and post measures of baseline cesarean rates and those at the end of an annual performance period.

Summary

Section 3 described my project's plan that includes the evaluation of a 2 years period of data in our organization following implementation of evidence-based based project aimed at a reduction in cesarean birth rates. The project question was: Have cesarean birth rates changed following implementation of evidenced based standardized labor management guidelines within a large northwest the hospital? Section 4 reviews the results and recommendations.

Section 4: Findings and Recommendations

Introduction

The purpose of this project was to use the analysis of existing organizational data to assess whether any demonstrated differences existed in mode of delivery following implementation of labor management bundles in a large hospital in the northwestern United States. Specifically, I aimed to determine the effectiveness of the overall intervention on cesarean birth rates before progressing to examine labor management bundle effectiveness by NTSV population subset and overtime. Therefore, I closely examined and determined the statistical significance of differences between baseline NTSV cesarean section rates before and after completion of a performance period in which standardization of labor management bundles were implemented. I conducted χ^2 tests to compare differences between observed results and the expected results of data following implementation of labor management bundles. In this section, I present the summaries of the descriptive data, data analysis using the χ^2 test. I utilized IBM SPSS Statistics Version 22 to conduct data analysis. The overarching project question guiding this study was as follows: Have cesarean birth rates have changed following implementation of evidenced-based standardized labor management guidelines within a large hospital in the northwestern United States?

Sample

The sample included data sets from three periods: (a) the preintervention, or baseline period of calendar year 2014, which is the year before implementation of the intervention; (b) 1 year postintervention (April 2015 to March 2016); and (c) 2 years postintervention (April 2016 to March 2017) after implementing the quality improvement

initiative. Data sets of the three periods included data for NTSV cesarean rate as a percentage of cesarean all births within the organization, NTSV cesarean labor abnormality, and labor management bundle.

Descriptive Statistics

In the baseline period of the year 2014, the total NTSV cesarean birth rate was 31.7%, or 437 of 1,379. A total of 249 of 1,379 (18.1%) of the NTSV labor population with spontaneous labor had a cesarean birth, which is equivalent to 57.5% of the total NTSV cesarean rate. The reasons cited for decisions to perform a cesarean following spontaneous labor were as follows: (a) 17.4%, or 177 of 1,019 cesarean procedures, were performed due to labor abnormality (failure to progress [FTP] or cephalic pelvic disproportion [CPD]); (b) 6.5%, or 66 of 1,019, was due to fetal concern; and (c) 0.6%, or six of 1,019, was attributed to other (maternal concerns). A total of 111 of 1,379 (8%) of the NTSV labor population that had induced labor had a cesarean birth, which is equivalent to 25.4% of the total NTSV population. The proportion of the NTSV population for induced labor that had a cesarean for the specific indication includes the following: (a) 31.6%, or 90 of 285, was due to FTP/CPD; (b) 5.6%, or 16 of 285, was due to fetal concern; and (c) 1.8%, or five of 285, was due to other reasons. A total of 75 of 1,379 (5.4%) had no labor, which is equivalent to 17.1% of the total NTSV cesarean rate. There were 186 cesarean cases for labor abnormality. However, no labor management bundles data were available for the baseline time period as this is preintervention data.

In the postintervention period of 1 year (2015 to 2016) after implementation of the quality improvement initiative, the total NTSV rate was 31.1%, or 456 of 1,468 cesarean births. A total of 235 of 1,468 (16%) of the NTSV labor population with spontaneous

labor had a cesarean birth, which is equivalent to 51.6% of the total NTSV cesarean rate. The reasons cited for decisions to perform cesarean births following spontaneous labor were as follows: (a) 15.5%, or 164 of 1,059 cesarean procedures, were performed due to labor abnormality (Failure to progress [FTP] or Cephalic Pelvic Disproportion [CPD]; (b) 6.1% or 65 of 1059 was due to fetal concern; and (c) 0.6% or six of 1,059 was attributed to other (maternal concerns). A total of 125 of 1,468 (9%) of the NTSV labor population had induced labor that had a cesarean birth, which is equivalent to 27.4% of the total NTSV population. The proportion of the NTSV population for induced labor that has a cesarean for specific indication includes the following: (a) 31.3%, or 98 of 313 was due to FTP/CPD; (b) 8.3%, or 26 of 313 was due to fetal concern; and (c) 0.3%, or one of 313 was due to other reasons. A total of 96 of 1,468 (6.5%) had no labor, which is equivalent to 21.6% of the total NTSV cesarean rate. A total of 142 cesarean births were attributed to labor abnormalities. In addition, the collective percentage of compliance with labor management bundles within the NTSV population was included to assess whether labor management bundles met accepted criteria for the duration of time in labor. Regarding data on NTSV C/S labor abnormality and labor management bundle 1 year after implementation of the quality improvement initiative, the following were observed:

- For labor arrest less than 6 cm, spontaneous labor, 13 of 13 cases of spontaneous labor that had a cesarean birth did not meet the labor management guidelines (0% meeting guidelines).
- For labor arrest less than 6 cm, induced labor, 15 of 23 cases of induced labor that had a cesarean birth met the labor management guidelines (65.2%). There were eight fallout cases for this category.

- For active phase greater or equal to 6 cm, 36 of 45 cases of active labor that had a cesarean birth met labor management guidelines (80%). There were nine fallout cases for this category.
- For second-stage arrest, 50 of 54 cases of second stage arrest that had a cesarean birth met labor management guidelines (92.5%). There were four fallout cases for this category.
- A total of 101 of cesarean birth cases met compliance of labor management.
- A total of 189 cases were unable to meet bundle guidelines due to maternal/fetal concern.

In the postintervention period of 2 years (2016 to 2017) after implementation of the quality improvement initiative, the total NTSV cesarean birth rate was 29.4 %, or 428 of 1,455. A total of 221 of 1,455 (15.7%) of the NTSV labor population with spontaneous labor had a cesarean birth, which is equivalent to 51.7% of the total NTSV cesarean rate. A total of 140 of 1,455 (9.6%) of the NTSV labor population with induced labor had a cesarean birth, which is equivalent to 32.7% of the total NTSV cesarean rate. The reasons cited for cesarean births following labor were as follows: (a) 14.6%, or 149 of 1, 023 cesarean births, were performed due to labor abnormality (Failure to progress [FTP] or Cephalic Pelvic Disproportion [CPD]; (b) 6.1%, or 62 of 1, 023; (c) 6.1% was due to fetal concern; and 1.2% or 12 was attributed to other concerns (maternal concerns). A total of 145 of 1, 455 (9%) of the NTSV population had induced labor had a cesarean birth, which is equivalent to 32.7% of the total NTSV population. The proportion of the NTSV population for induced labor that had a cesarean for a specific indication includes the following: (a) 25.5%, or 99 of 338 due to FTP/CPD; (b) 10.1% or 39 of 388 due to fetal

concern; and (c) 1.8% or seven of 388 due to other reasons. A total of 67 of 1,455 (4.6%) had no labor, which is equivalent to 15.6% of the total NTSV cesarean rate. A total of 179 cesarean births were attributed to labor abnormalities. Regarding labor abnormality data and labor management bundle compliance 2 years after implementation of the quality improvement initiative, the following were observed:

- For labor arrest less than 6 cm, spontaneous labor, 12 of 12 cases of spontaneous labor that had a cesarean birth that did not meet the labor management guidelines (0% meeting guidelines).
- For labor arrest less than 6 cm induced labor, 14 of 25 cases of induced labor that had a cesarean birth met the labor management guidelines (56%). There were 11 fallout cases for this category.
- For active phase greater or equal to 6 cm, 30 of 44 cases of active labor that had a cesarean birth met labor management guidelines (71.4%). There were 12 fallout cases for this category.
- For second stage arrest, 77 of 86 cases of second stage arrest that had a cesarean birth met the labor management guidelines (89.5%). There were nine fallout cases for this category.
- There were a total of 121 of cases that met compliance of labor management.

Table 2

Data of NTSV Cesarean Rates, % of NTSV Labor Population With Spontaneous Labor, Induced Labor, and No Labor During Baseline Period and Postintervention Period

Data	Period		
	Baseline (2014)	1 year after implementation of intervention (2015–2016)	2 years after implementation of intervention (2016–2017)
Total cesareans rates	31.7%	31.1%	29.4%
Spontaneous labor that had a cesarean birth (% of NTSV labor population)	57.5%	51.6%	51.7%
Induced labor that had a cesarean birth at (% of NTSV labor population)	25.4%	27.4%	32.7%
No Labor (% of NTSV labor population)	17.1%	21.0%	15.6%

Table 3

Cross Tabulation of Data of NTSV Cesarean Labor Abnormality and Labor Management Bundle 1 Year After Implementation of Intervention (April 2015 to March 2016)

		Labor management bundle					
		Did not meet bundle requirements	Met bundle requirements		Fallout cases	Denominator cases	Excluded cases
			n	%			
NTSV C/S labor abnormality	<6 cm, spontaneous labor	13	0	0		13	3,931
	<6 cm induced labor	8	15	65.20	8	23	3,922
	Active labor greater or equal to 6 cm	9	36	80.00	9	45	3,900
	Second-stage arrest	4	50	92.50	4	54	3,891

Note. No. of labor abnormalities = 142.

Table 4

Cross Tabulation of Data of NTSV Cesarean Labor Abnormality and Labor Management Bundle 2 Years After Implementation of Intervention (April 2016 to March 2017)

		Labor management bundle					
		Did not meet bundle	Met bundle requirements		Fallout cases	Denominator cases	Excluded cases
			n	%			
NTSV C/S labor abnormality	<6 cm, spontaneous labor	12	0	0			3,782
	<6 cm induced labor	11	14	56.00	11	25	3,770
	Active labor greater or equal to 6cm	12	30	71.40	12	44	3.751
	Second-stage arrest	9	77	89.50	9	86	3.709

Note. No. of labor abnormalities = 179.

Results of Inferential Statistics

I conducted χ^2 tests to compare differences between observed and the expected results of data following implementation of labor management bundles. I divided two sets of data (pre and postimplementation of quality improvement program) into categories. A χ^2 test was conducted to discover whether total numbers of NTSV cesarean cases were significantly changed after implementation of evidenced-based standardized labor management bundles within a large hospital in the northwestern United States.

χ^2 test were conducted to determine any relationships between intervention status (pre- and posttest) and total number of NTSV cesarean cases. The total number of NTSV cesarean cases is measured as a total number of NTSV cases of cesarean births with the organization. I chose to perform the χ^2 because the independent variable of intervention status has only two categories while the dependent variable is a measured using frequency of cases. I conducted the χ^2 test to determine whether the total number of NTSV cesarean cases were significantly different between pre and postintervention and assess the effect of the implemented quality improvement intervention on NTSV cesarean rates. A level of significance of 0.05 was used in the χ^2 test. There is a significant relationship or difference if the p-value is equal or less than the level of significance value of 0.05. Different χ^2 test was used for comparison of pretest versus the first year posttest.

Comparison of Pre-test versus First Year Post-test

χ^2 test results in Table 5 showed that the NTSV cesarean rate between pre- and first year post-intervention was not significantly different ($X^2(1) = 0.40$, $p = 0.53$). This was because the p-value was greater than the level of significance value of 0.05. In addition, it

should be noted that in all three years (2014, 2015-2016, and 2016-2017) there were similar percentages of vaginal (63%) and cesarean births (37%).

Table 5

Cross Tabulation of Total Number of Cesarean Cases During Pre- and First-Year Postintervention Period

	Observed *N*	Expected *N*	Residual
Before	437	446.5	-9.5
After	456	446.5	9.5
Total	893		

Table 6

χ^2 Test Results of Difference of Total Number of NTSV Cesarean Cases Between Pre- and First-Year Postintervention Period

	Value	*df*	Asymp. Sig. (2-sided)
Pearson χ^2	0.40[a]	1	0.53

[a]0 cells (0.0%) have expected count less than 5. The minimum expected count is 446.5.

In addition, I conducted χ^2 test to determine differences in frequencies of spontaneous labor and induced labor cesarean births that met labor management guidelines during the pre- and first year postintervention period. A level of significance of 0.05 was used in the χ^2 test. χ^2 test results in Table 7 showed frequencies of spontaneous labor that met the labor management guidelines and had cesarean birth ($X^2(1) = 0.41$, $p = 0.53$), induced labor that met labor management guidelines and had cesarean birth ($X^2(1) = 0.83$, $p = 0.36$), and no labor ($X^2(1) = 2.58$, $p = 0.11$) were not significantly different between the pre- and first year postintervention period because the p-values were greater than the level of significance value of 0.05. Results indicate

frequencies of spontaneous labor and induced labor that met labor management guidelines and had a cesarean birth did not significantly change following implementation of evidenced-based intervention of standardized labor management guidelines in the large hospital in the northwestern United States.

Table 7

Cross Tabulation of Frequencies of Spontaneous Labor and Induced Labor that had a Cesarean Birth, and No Labor during Pre- and First Year Postintervention Period

		Observed *N*	Expected *N*	Residual
Spontaneous labor cesarean birth	Pre	249	242.0	7.0
	Post	235	242.0	-7.0
	Total	484		
Induced labor cesarean birth	Pre	111	118.00	-7
	Post	125	118.00	7
	Total	236		
No labor	Pre	75	85.5	-10.5
	Post	96	85.5	10.5
	Total	171		

Table 8

χ^2 Test Results of Differences of Frequencies of Spontaneous Labor, Induced Labor that had a Cesarean Birth, and No Labor between the Pre- and First Year Post- Intervention Period

Dependent Variable	Pearson χ^2 Value	df	Asymp. Sig. (2-sided)
Spontaneous labor cesarean birth	0.41	1	0.53
Induced labor cesarean birth	0.83	1	0.36
No labor	2.58	1	0.11

Comparison of Pre-test versus Second Year Post-test

There is little difference in NTSV cesarean rate between the pre and first year postintervention because it is a short period of comparison. I conducted another run of χ^2 to determine whether a greater difference in proportion existed between pre- and second year postinterventon, and examined differences in frequencies of NTSV cesarean rate, spontaneous labor and induced labor that had cesarean birth that met labor management guidelines during pre- and second year of the post-intervention period. A level of significance of 0.05 was used in the χ^2 test. χ^2 test results in Table 9 showed that NTSV cesarean rate ($X^2(1) = 0.09$, $p = 0.66$), frequencies of spontaneous labor that met the labor management guidelines that had cesarean birth ($X^2(1) = 1.67$, $p = 0.20$), induced labor that had cesarean birth that met labor management guidelines ($X^2(1) = 3.35$, $p = 0.07$), and no labor ($X^2(1) = 0.45$, $p = 0.50$) with p-values all greater than the level of significance value of 0.05.

Table 9

Cross Tabulation of Frequencies of Total Number of NTSV Cesarean Cases, Spontaneous Labor had a Cesarean Birth, Induced Labor that had a Cesarean Birth, and No Labor during Pre- and Second Year Post-Intervention Period

		Observed *N*	Expected *N*	Residual
Total Number of Cesarean Cases	Pre	437	432.5	4.5
	Post	428	432.5	-4.5
	Total	865		
Spontaneous labor cesarean birth	Pre	249	235	14
	Post	221	235	-14
	Total	470		
Induced labor cesarean birth	Pre	111	125.5	-14.5
	Post	140	125.5	14.5
	Total	251		
No labor	Pre	75	71	4
	Post	67	71	-4
	Total	142		

Table 10 χ^2 *Test Results of Differences of Total Number of NTSV Cesarean Cases, Frequencies of Spontaneous Labor had a Cesarean Birth, Induced Labor that had a Cesarean Birth, and No Labor between the Pre- and Second Year Post-Intervention Period*

Dependent Variable	Pearson χ^2 Value	df	Asymp. Sig. (2-sided)
NTSV Cesarean Cases	0.09	1	0.66
Spontaneous labor that had a c/s	1.67	1	0.20
Induced labor hat had a c/s	3.35	1	0.07
No labor	0.45	1	0.50

Summary

The purpose of my project was to evaluate of a quality improvement project that used a standardized approach to incorporate evidence-based labor management bundles and assess whether a difference exists in primary cesarean sections after implementation. Results of the χ^2 test showed no statistical significant difference comparing pre and post

measures of baseline cesarean rates and labor management bundle cesarean rates between the pre-test and first year post-test period; and between the pre-test and second year post-test period. The results suggested cesarean rates, frequencies of spontaneous labor and induced labor that had a cesarean birth and met labor management guidelines in the large hospital in the northwestern United States did not significantly change following implementation of the intervention of evidenced based standardized labor management guidelines. Section 5 includes further discussion of the results presented in this section. Each of the results of the different statistical analysis will be reviewed and the potential implications for each of the results of the analysis will be discussed in the following section.

Section 5: Dissemination Plan

Discussion of Findings in the Context of Literature

The literature that I referenced in Section 2 of this project indicated the need to develop a standardized labor management bundle in a particular nonprofit regional medical center located in the Pacific Northwest. Statewide hospitals have reported annual increases in cesareans that are higher than the Washington State benchmark goal of 27% and the Healthy People 2020 goal of 23.9 % (Healthy People, 2015). The hospital under study has one of the highest statewide rates, with an annual delivery of approximately 4,000 infants, of which 30%, or 1,200 newborns are born via cesarean. Nationally, cesareans are the most common surgery conducted in the United States, with approximately 33% of women giving birth via this method (ACOG, 2014).

The increase in cesarean delivery poses concern, because it presents several risks to the mother. Having a cesarean birth increases the likelihood for a woman to have future cesarean births. Moreover, cesarean birth poses a greater risk of maternal morbidity and mortality that is higher than that of vaginal birth (ACOG, 2014; CDC, 2015; Main, 2015). When compared with vaginal birth, cesareans are associated with increased health risks for mothers and their newborns, such as longer hospitalization length of stay and negative effects on the future reproductive health of mothers, both of which are associated with increased health care use and costs (King et al., 2013). According to literature, standard needs are not being met to facilitate vaginal birth, which consequently yields an increase in cesarean deliveries (Spong et al., 2012). These methods may include a lack of standardization in labor management practices, specifically lack of adequate time allotted for normal phases of the labor process when

maternal and fetal conditions permit (Spong et al., 2012). According to research, adequate labor time has been found to be longer than traditionally estimated (Spong et al., 2012). Aside from time allowed, many reasons contribute to the incidence of cesareans, and others may have yet to be determined. However, the decision to perform a cesarean delivery should not preempt an adequate attempt at vaginal birth if both maternal and fetal conditions permit (Spong et al., 2012). Because cesareans are increasing nationally, perhaps all methods are not being considered to avoid the surgery whenever possible. Because of the aforementioned data on the incidence of cesareans, cesareans may be conducted partly for convenience rather than necessity.

The purpose of this project was to use analysis of existing organizational data to assess whether demonstrated differences exist in mode of delivery following implementation of labor management bundles in a large hospital in the northwestern United States. Implementation of labor management bundles was an approach to circumvent gaps in existing practices, including a lack of standardization of labor induction, first-stage labor management, and second-stage labor management, as well as the lack of time allotted for the labor to progress. Although it is beyond the scope of this project to determine cause and effect, my goal was to note differences between baseline NTSV caesarean section rates before and after completion of a performance period in which standardization of labor management bundles were implemented.

Scholars have emphasized the significance of the outcomes in predicting the management practices that may have led to a decrease in the annual percentage of cesareans performed at this particular medical center in the northwestern United States. However, the literature does not mention the possibility of receiving similar results for

before and after the enforcement of management practices. According to the results of my study, the total number of NTSV cesarean cases indicated that 437 cesareans were performed during the preintervention period in 2014, followed by 456 cesareans 1 year postintervention in 2015, and 428 cesareans 2 years postintervention in 2016. Although the number ultimately decreased from the preintervention stage to 2 years postintervention, the number increased after 1 year of the intervention period. This indicates that the labor management practices did not have any significant effect on the incidence of cesareans at this particular hospital. Moreover, data analysis also indicated that frequencies of spontaneous labor and induced labor, which resulted in a cesarean birth and met labor management guidelines, did not significantly change after implementation of evidence-based standardized labor management guidelines.

As previously stated, results indicate labor management practice proved ineffective in decreasing the incidence of cesarean births at this particular medical center. My findings suggest a relationship did not exist between the labor management bundle and the incidence of cesareans. Literature and knowledge of current evidence presumed that labor management bundles and their effect on the mode of delivery could provide significant information to the field of nursing, particularly those working in labor and delivery. In the same vein, a consensus paper about labor management care published by the ACOG and the SMFM established guidelines to reflect advances in labor management strategies that are predicted to decrease cesarean births (ACOG & SMFM, 2016). In addition research has discovered a variation in the lack of labor management practices noting the inadequate time allotted for normal phases of the labor process (Spong et al., 2012). However as previously stated, results denote that none of the labor

management practices contributed significantly to the incidence of cesareans at this particular hospital. Results suggest other forces are at play, which may be directly or indirectly contributing to the incidence of cesarean births at this hospital.

Findings and Implications

The result of the analysis indicates a need for additional research. The labor management practices enforced at this particular hospital were aimed at performance measures that ultimately did not affect the cesarean incidence. Reasons such as a lack of standardization of labor induction, first stage and second stage labor management and time allotted for labor progress, were not directly associated with the incidence of cesarean sections at this northwestern hospital. Additional research may call for the development of other labor management bundles or practices that target performance measures related to the incidence of cesareans. Whether new or modified measures are discovered and adopted, a similar framework with pre and postimplementation evaluation could provide significant quality improvement information. Furthermore, in order to determine the accuracy of my results, a similar study could explore data three years to five years post intervention to record the effect on cesarean incidence.

Although my research did not find a statistical significant relationship exists between the labor management bundle and the cesarean incidence, there was a slight decrease between the preimplementation stage of labor management practices and postimplementation rates. Because the noted difference suggests a relationship may exist between labor management bundle adoption and the incidence of cesareans, additional time may be needed in order to reach an optimal level of significant influence. The first year following implementation, is transitional for staff adapting to the information

presented by the project. The second year an expected adaptation could signify the noted slight decrease, and therefore consecutive years of sustained quality improvement efforts may result in lower cesareans rates. In light of my findings and considering an extended frame for evaluation of implementation efforts, continued appraisal of the labor management bundle for another year could determine whether to continue or to adjust existing practices. On the contrary, the facets of the program may not be contributing to the incidence of cesareans. The incidence of cesareans is not due to inadequate time for the natural birthing process alone. Exploration of additional factors and potential possibilities related to the labor management at this particular hospital suggest further research into existing practices, which will therefore influence future policies and quality improvement efforts. My assessment may be used to inform the evaluation of the quality improvement project efforts, and for future continued focus on quality improvement attempts targeted at safely reducing cesarean births.

Recommendations

Despite the data analysis demonstrating a statistically significant relationship does not exist between the labor management bundle and the incidence of cesareans, the results are indeed helpful for the hospital in question. Moreover the information may also prove advantageous to the field of health care as well as all childbearing women residing in the United States. Cesareans as previously stated, pose greater health risks to both the mother and child. By determining labor management bundles proved insufficient in lowering the cesarean incidence in this particular hospital, it may suggest that greater forces are contributing to this incidence including a wide variety of collective influential factors (e.g., health of the mother and fetus) mother's age, gestational age, ethnicity,

geographical location, and caregivers' preferences.

The results of my study could prompt similar studies to be conducted in other facilities to determine whether the unsuccessful decrease in cesarean rates following labor management recommendations was universal, or an isolated incidence within this particular hospital. In addition, my findings could contribute to the body of knowledge for expectant mothers, providing patients with adequate information about the incidence of cesareans and encourage expectant mothers to engage in conversations with their health care providers about cesarean birth and/or a desire to avoid surgery if at all possible. The information presented in this study could encourage health care facilities nationwide to conduct similar studies. Other organizations could seek to determine whether results are generalizable, or whether lack of success was an isolated event. In addition, shared knowledge could prompt the organization in question as well as other organizations to consider alternative factors that may be contributing to the increasing incidence of cesareans. The information in my research could encourage expectant mothers to have greater awareness about the incidence of cesareans and potential risks. Knowledge gained may persuade mothers to vocalize their health care concerns pertaining to the birthing process and mode of delivery. Finally, the research has the possibility to increase awareness overall, within literature and scholarship, the health care sector and expectant mothers.

Strengths and Limitations

My study has several strengths and limitations. One of the strengths of this quantitative study is the data. Other researchers conducting future studies can access the data in question, which includes the annual birth rates, as well as the incidence of

cesarean versus vaginal births. The information is quantitative and cannot be changed, modified or adjusted in any manner. The reported information is indicative of the incidence that occurred, which may therefore reveal larger relationships. It does not include human opinion or personal experience, which is qualitative in nature, signifying that different people can interpret the same experience differently. The information can only be interpreted in a single way, which relates to the information that it is quantitatively demonstrating. In addition, another strength of this study is if the hospital in question wishes to conduct or continue the same assessment to compare results with the present study, it would not prove difficult to duplicate the study. This is possible due to the data collection method and the enforced labor management bundle.

In contrast, several limitations of the study exist. First and foremost, the study was conducted within a single hospital in the northwestern pacific region of the United States with particular characteristics, and unique demographic patient profiles. For this reason, findings may only be indicative of the population in question, or of the population residing within proximity of the hospital. The same results may not prove true for facilities located on the opposite side of the country. For this reason, information provided in this project may prove isolated and may not generalize to a national health care context. Another limitation of this study includes the multiple reasons attributable to the decision of the mode of delivery. For example, the labor process is continually changing, difficult to predict or control for with the potential for many variables to be considered. While the potential for adequate time allotted to the natural birthing process may contribute to the incidence of cesareans, this may only be the case when other characteristics are present as well. Healthcare providers are a diverse group of individuals

with varying backgrounds and experience. Personal factors relating to the woman and her social environment, as well as regional and institutional factors of the organization constitute multiple non-medical aspects associated with the decision for the mode of delivery. The quantitative approach did not include the practical implication of human variables including variation in practice styles between the healthcare team. Qualitative research might provide more insight into the origin of the increasing cesarean birth rates. Therefore, a collection of behaviors that contributed to the cesarean attributed to the mother (e.g., the health care facilities) variation in practice styles, external factors or a combination of reasons may be present, For this reason, it may be difficult to pinpoint whether individual factors are responsible for the incidence.

Given the limitations of this study, future research should consider the wide range of variables. Most importantly, it would be beneficial to the health care field if the same or a closely similar study were conducted in a different hospital, whether located in Washington state or otherwise. This would provide grounds by which to compare results of both studies to discover similarities and/or differences to determine whether a relationship exists between the labor management bundle and the incidence of cesareans. Placement of the study into more of a national context rather than an isolated evaluation of a quality improvement project could be beneficial. Future studies should consider the long list of complications, challenges and variables that may contribute to the birthing process method. The incidence of cesareans may be related in part to reasons that are unrelated to the health care organization entirely. For this reason, it would also be advantageous for future consecutive studies, particularly those of smaller scale to include background information about the mothers to determine whether the cesareans were

conducted out of necessity, choice or otherwise. Qualitative research could provide an understanding of the cognitive and emotional aspects of clinical decision making themes or details in the organizational setting. Selection and exploration of a focus group could allow for in-depth information about the mothers in question, or their labor experience offering a more introspective perspective into the decision for or against cesarean. Therefore, future research should consider a combined methodology including qualitative research through interview or observation. Therefore, qualitative analysis could facilitate a robust and reliable inclusive analysis of additional contributions of the healthcare team, patients and an organizational context in order to identify factors associated with cesarean birth rates.

Dissemination of Project Results

The incidence of NTSV birth rates has warranted close monitoring and scrutiny on a national, state and local level, and a single hospital in the northwestern pacific region of the United States. Therefore, concerted efforts to reduce the number of non – medically induced cesarean births resulted in the evaluation of a quality improvement project aimed at decreasing a woman's risk of cesarean birth. The purpose of this project was to use the analysis of existing organizational data to assess if there are demonstrated differences in mode of delivery following implementation of labor management bundles in a large hospital in the northwestern United States. Specifically, labor management was chosen as it is determined to be a strong leverage point in the problematic cesarean rate (Neal & Lowe, 2012; Zhang et al., 2010). Leverage points are places within a complex system where one change can influence the whole system, which over time can create a significant change for the whole system (Zabari, 2016). Although allowing adequate time

in labor did not result in a statistically significant improvement, the results provide a foundation for articulating an understanding of the complex interrelated dynamics experienced in cesarean birth rates, and allow for further investigation beyond the specific events to reach a higher systemic level of understanding.

Cesarean rates have been historically monitored and benchmarked, and as a result nursing, providers and administration within our organization have experienced an increased emphasis and attention to the NTSV cesarean birth rates. Quality improvement is continuous with intent to improve outcomes through identifying areas is opportunity and testing new approaches and improve processes in healthcare.

Despite implementation of labor management bundles, the organizational context and motivation for a continued cesarean section rate that is higher expected remains poorly understood through quantitative analysis. The cesarean birth rate still has a profound impact on our organization, which offers the opportunity for continued communication among team members and increased motivation to understand analyzed data, implications and genesis of our rates. Uncertainty surrounding what factors will decrease cesarean birth remain unanswered and identification of additional factors to explain cesarean birth rates is crucial in finding solutions.

Dissemination of the project results will be shared with nursing and obstetric leaders of the women and infants' service line, the organization's perinatal collaborative quality committee and executive team, and unit-based staff meetings through a PowerPoint presentation. Dissemination project results promotes the chosen Model of Improvement and Plan Do Study Act (PDSA) cyclical model as a systematic and continuous approach to quality improvement (Institute of Health Care Improvement

[IHI], 2016; Kelly, 2011; Taylor, McNicholas, Nicolay, Darzi, Bell & Reed, 2014). Therefore, "Study," the third step of the process, includes dissemination data, post-intervention results to summarize what was learned and determine if course correction is needed with key stakeholders (Kelly, 2015). Additionally, dissemination of results allows for the final phase of the cycle to "Act" on results, noting changes and continued efforts needed to influence the cesarean birth rate. While the presentation will address the intervention of allowing adequate time in labor and the less than expected effect of cesarean birth rates within our organization, labor management is only one leverage point among multiple variables influencing whether a woman will give birth vaginally or via cesarean. Our organization is involved in an array of interdisciplinary interventions aimed at cesarean birth reduction, including but not limited to labor management bundles.

Collectively, our interventions included the implementation of labor management guidelines that have not resulted in a significant decrease in the overall, or NTSV labor management subset cesarean birth rates. Amid our lack of success, there is an opportunity for continued investigation, and a collaborative process through communication. Open communication and dissemination of the results of quality improvement projects are consistent with the iterative Model of Improvement, providing feedback and a mechanism to launch a broader discussion of additional variables, leverage points and next steps.

Analysis of Self

In regards to this study, my role was to analyze data related to implementation of labor management bundles and cesarean birth rate. The data quantitative in nature was reflective of the information it presented. In other words, the data did not require overt

explanation as the incidence rates were revealed in the numerical data. In order to analyze the data, I accessed data of the single site hospital in question. I did not interact with any of the patients in question, or learn in-depth information about the nature of the personal cases. My role was exclusively that of executing the analysis of data already collected.

My roles as an advanced practice health care practitioner and as an evidence-based project member are contradictory. As an advanced practice professional, the results of this study indicate that future research is needed. Although results reveal labor management bundles may have been unsuccessful, which signifies the variables in question during this research were not outstanding contributors to the incidence of cesareans, it does not provide information about what is causing the incidence. Each study considering the rising incidence of national cesarean rates will bring health care providers closer to finding the source of the problem. This study prompts a need for future research, which can prove costly, time consuming, and in some cases unfeasible. Future studies including quantitative and qualitative methods about the topic would prove helpful, whether conducted on a small scale or a national scale. On the contrary, as a Doctorate of Nursing Practice scholarly project, this study contributes to the lack of information available about the incidence of cesareans in the United States. I believe this research will prompt the execution of additional studies on the issue, perhaps in other areas of the country. Additionally, the project revealed variables that were not affecting the cesarean delivery incidence and may be equally important in determining that which contributes to the incidence. Finally, I also believe the information presented in this study may prove helpful to expectant mothers, who may be less informed on the increasing incidence of cesarean. This research could prompt expectant mothers to question their

health care provider regarding cesareans birth rates and seek more information. The overall objective is to offer a greater pool of knowledge about this topic, and I believe this study successfully fulfilled this goal.

This project as previously stated suggests a need for future research projects on the problem in question. Due to the seemingly inconclusive results of the data analysis, it may be advantageous to duplicate this research study either in the health care hospital in question or otherwise to compare results. The need for future research is also revealed through the inconclusiveness of the factors that influence the incidence of cesareans. The data did not reveal the source of the increase of cesareans, but rather the incidence of cesareans. In order to understand the reason for incidence, it is important to understand the characteristics contributing to the incidence. These reasons have not yet been found indicating future studies are necessary to address local, regional and national increase in cesareans.

Summary and Conclusions

The purpose of the project was to use the analysis of existing organizational data to assess whether a demonstrated differences exists in mode of delivery following implementation of labor management bundles in a large hospital in the northwestern United States. Results of the χ^2 tests showed there was no statistically significant difference comparing pre- and postintervention measures of baseline cesarean rates at the end of a 1 and 2 year performance period. Comparison of cesarean birth rates exhibited rates during the three periods investigated including baseline period, 1 year after implementation of the quality improvement initiative, and 2 years after implementation have very close values. Also, comparison of the rate of non-medical cesareans that met

the labor management guidelines were greater than the rate of non-medical cesareans that met the labor management guidelines during the period of one year after implementation of the quality improvement initiative as compared to the period of two years after implementation in each of subset of the NTSV laboring population of 6cm, spontaneous labor, less than 6cm induced labor, active labor greater or equal to 6cm, and second stage arrest.

The cesarean rate still has a profound impact on our organization. The use of quantitative methodology to evaluate the statistical significance of labor management bundles and cesarean birth rates did not include the practical implication of human variables and may be too focused and narrow. The seemingly unsuccessful results of the labor management bundle indicate the need for future research about the topic, particularly with regard to that which is contributing to the incidence of rising cesareans. However, despite the results of the research providing that a relationship does not exist between the labor management bundle and the cesarean rate, this research contributes to the body of scholarship about the topic.

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