

Reducing the Primary Cesarean Birth Rate: A Quality Improvement Project

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Introduction: Research continues to support vaginal birth as the safest mode of childbirth, but despite this, cesarean birth has become the most common surgical procedure performed on women. The rate has increased 500% since the 1970s without a corresponding improvement in maternal or neonatal outcomes. A Colorado community hospital recognized that its primary cesarean birth rate was higher than national and state benchmark levels. To reduce this rate, the hospital collaborated with its largest maternity care provider group to implement a select number of physiologic birth practices and measure improvement in outcomes.

Process: Using a pre- and postprocess measure study design, the quality improvement project team identified and implemented 3 physiologic birth parameters over a 12-month period that have been shown to promote vaginal birth. These included reducing elective induction of labor in women less than 41 weeks' gestation; standardizing triage to admit women at greater than or equal to 4 cm dilation; and increasing the use of intermittent auscultation as opposed to continuous fetal monitoring for fetal surveillance. The team also calculated each obstetrician-gynecologist's primary cesarean birth rate monthly and delivered these rates to the providers.

Outcomes: Outcomes showed that the provider group decreased its primary cesarean birth rate from 28.9% to 12.2% in the 12-month postprocess measure period. The 57.8% decrease is statistically significant (odds ratio [OR], 0.345; $z = 6.52$, $P < .001$; 95% confidence interval [CI], 0.249-0.479).

Discussion: While this quality improvement project cannot be translated to other settings, promotion of physiologic birth practices, along with audit and feedback, had a statistically significant impact on the primary cesarean birth rate for this provider group and, consequently, on the community hospital where they attend births.

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INTRODUCTION

Research continues to support vaginal birth as the safest mode of birth for both women and newborns.¹ Despite this evidence, cesarean birth has become the most common surgical procedure performed on women in the United States.² While no one would argue against this increased use to save the lives of women and newborns, the US maternal and neonatal morbidity and mortality have not improved despite spending more health care dollars per capita and performing more surgeries.³

More than 50% of women having cesarean births are women giving birth for the first time who enter labor with no risk factors for surgery.⁴ Efforts by the American College of Nurse-Midwives, the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN), the American College of Obstetricians and Gynecologists, and the Society for Maternal Fetal Medicine to reduce this first cesarean birth have focused on providers' labor management and the identification of physiologic birth parameters that encourage vaginal birth. Some of these parameters discussed in consensus statements, recent research, and reviews include but are not limited to: 1) waiting for labor to begin and progress on its own^{1,5-7}; 2) admission to hospital labor and delivery units in active labor as opposed to pre-active labor^{5,7,8}; 3) freedom of movement in the absence of any fetal compromise that can be achieved

with listening to the fetal heart intermittently with a handheld Doppler or electronic fetal monitor^{5,8-13}; 4) no restrictions on food and drink⁵; 5) the continuous presence of a support person or doula who is not part of the medical team^{5,14}; 6) revised time limits on the progress of labor^{1,5}; 7) upright positions for pushing and delayed pushing until the woman feels the spontaneous urge to push^{5,14}; and 8) access to certified nurse-midwife (CNM)-attended births versus conventional care that includes an obstetrician-gynecologist solely.^{13,14}

Local Problem

Lutheran Medical Center, Wheat Ridge, Colorado, is one of 9 hospitals in the Sisters of Charity of Leavenworth Health System. It is home to approximately 2600 births a year. This hospital had the second highest cesarean birth rate in the system in 2014.¹⁵ Westside Women's Care, a privately-owned practice, employs 7 obstetrician-gynecologists and 7 CNMs who attend approximately 60% of the births at the medical center. The primary cesarean birth rate for this practice from April 2014 to March 2015 was 28.9%, the highest of all of the medical center provider groups. The primary cesarean birth rate in Colorado in 2013 was 16.6%, and the Healthy People 2020 goal for primary cesarean birth is 23.9%.^{16,17} To help the medical center and Westside Women's Care provide the safest mode of birth and meet benchmark levels for the primary cesarean birth rates, a quality improvement project was organized.

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Quick Points

- ◆ Implementing evidence-based practices that promote vaginal birth helped a single maternity care provider group at a community hospital decrease its primary cesarean birth rate.
- ◆ Providing obstetricians with their higher-than-average primary cesarean birth rates may have influenced their management practices during labor and birth.
- ◆ Promoting physiologic birth parameters during a 12-month quality improvement project led to a decrease in unnecessary interventions and an increase in vaginal births.

Project Aim and Intended Improvements

To decrease the primary cesarean birth rate at Westside Women's Care and, consequently, at Lutheran Medical Center, a quality improvement team was formed composed of the first author as project lead, an obstetrician-gynecologist and CNM from Westside Women's Care, the medical center's clinical practice specialist, the director of Women's and Family Services, a quality manager, and an Education Council consisting of 8 labor and delivery nurses. The primary goal of the project was to decrease the primary cesarean birth rate by 25% from 28.9% to 21.7% or less during a 12-month measurement period. The target population was nulliparous women at greater than or equal to 37 weeks' gestation with a singleton pregnancy in the vertex position who were patients of the obstetrician-gynecologists and CNMs at Westside Women's Care and who birthed at Lutheran Medical Center.

Prior to the initiation of this project, the labor and delivery unit had implemented several of the management techniques shown to promote vaginal birth including encouraging nutrition in labor, allowing longer for latent stage of labor and second stage of labor, position changes for pushing, and having CNMs on the unit. The quality improvement team then identified the missing physiologic birth parameters that have been shown to promote vaginal birth and focused on these. The specific improvements in care processes and patient outcomes identified for the project included 1) increased reporting of cesarean birth rates to providers to 100% each month^{18,19}; 2) reducing the number of women who had elective induction of labor at less than 41 weeks' gestation by 80% (from 15.5% to 3%)^{1,5-7,20-22}; 3) increasing the number of women who were admitted to the hospital in active labor as opposed to early labor to 50%^{5,8}; and 4) increasing the number of women who received fetal monitoring by intermittent auscultation rather than continuous monitoring to 50%.^{5,7,9-12}

PROCESS

Sample and Setting

This collaborative effort was a first-time change effort for the providers of Westside Women's Care and part of Lutheran Medical Center's ongoing quality improvement efforts. The project was reviewed by the SCL Health-Front Range institutional review board and deemed exempt.

All nulliparous women at greater than or equal to 37 weeks' gestation with a single fetus in the vertex position were included in the sample during the 12-month

measurement period. Excluded were women who had a medical indication for cesarean birth including previous uterine surgery (fibroid removal) that could increase their risk of uterine rupture, as well as women who had been diagnosed with placenta previa. Women were also excluded if they had any medical indication for induction of labor, admission before active labor, or continuous monitoring rather than intermittent auscultation.

Women received prenatal care from the 14 providers at Westside Women's Care at their offices in suburban Wheat Ridge and Arvada, Colorado, and birthed at the medical center's labor and delivery unit. In addition to the providers, medical assistants from Westside Women's Care and the labor and delivery staff at the medical center participated in this project.

Intervention and Process Measures

The 4 process measures were implemented using the Institute for Healthcare Improvement's quality improvement Plan-Do-Study-Act (PDSA) cycles.²³ With this tool, rapid changes aimed at achieving each process measure's goal were planned, put into action, evaluated for weaknesses and modified where needed, and, ultimately, standardized. All process measures emphasized current policy at the medical center and equipped the providers and nursing staff with evidence-based strategies to decrease interventions and subsequently reduce the primary cesarean birth rate.

The first process measure, audit and feedback, was measured from April 2015 to March 2016. Lutheran's quality manager was able to calculate each obstetrician's primary and total cesarean birth rates. These rates were initially hand delivered to each provider at the monthly hospital section meeting. On further analysis, not all providers attended this meeting every month, so this approach was not sustainable. The rates were then sent by e-mail. Some of the providers said they did not routinely open their e-mail. The software developer for the medical center's electronic medical record was contacted to design a dashboard that could be accessed at provider login and would provide this information. The dashboard was live on December 1, 2015, and is undergoing further improvement for utility.

The second process measure, reduction of elective induction of labor in women at less than 41 weeks' gestation, began in April 2015 and continued through March 2016. Prior to the project, providers randomly scheduled inductions of labor in women without medical indication between 39 and 42 weeks' gestation. This had become an expectation of many patients.

A meeting of the practice obstetrician-gynecologists and CNMs concluded with all providers agreeing to offer elective induction only to nulliparous women at 41 weeks' gestation. The providers were instructed to begin counseling women at their 36-week visit that it was the policy of the practice to not induce until 7 days past the estimated due date unless it became medically necessary sooner. A handout developed by AWHONN as part of the "Go the Full 40" campaign was given to the patients at this visit, and the provider documented in the chart that this counseling had been done. During the first 3 months of the project, the project lead conducted chart reviews to see if the providers were completing the education and documenting this in the chart. With the percentage greater than 80% in each of these months, the reviews became less frequent. A video version of this counseling was also embedded on the practice website for patient use.

The third process measure, increasing the number of women admitted to labor and delivery at equal to or greater than 4 cm, began in July 2015 and continued through March 2016. Acknowledging that 6 cm is now used as the dilatation point to begin evaluating for labor dystocia, the team agreed that at least 4 cm was a realistic dilatation criterion for admission, as many patients request pain relief at this point. A triage flow sheet was developed that guided decision making when women presented to the medical center's labor and delivery unit with report of contractions (Figure 1). The flow sheet was trialed with the nurses on the Education Council and modified based on their feedback. The flow sheet was revised to include information on where to find patient handouts and specific language for patient education and was then introduced to the whole unit. When patients arrived for triage, the flow sheet was printed out with outpatient paperwork, completed by the nurses, and returned to a file box on labor and delivery. The project lead gathered these triage flow sheets every week and logged outcomes.

The final process measure, increasing the use of intermittent auscultation, began in December 2015 and continued through March 2016. A survey was sent by e-mail to the providers and nurses to assess their knowledge of and comfort with intermittent auscultation. Many nurses stated a barrier to use was the providers' desire for continuous monitoring. The providers stated they were comfortable with the practice and allowed the nurses to choose the mode of fetal monitoring as long as they followed guidelines. The hospital's current guidelines for intermittent auscultation existed as a paragraph within the fetal heart monitoring guidelines. A separate guideline including inclusion and exclusion criteria for intermittent auscultation was written and implemented. (Supporting Information: Appendix S1). An educational poster was created to empower the nurses to use this method and signs were posted in all rooms reminding nurses of the procedures. A speaker experienced with intermittent auscultation was featured at a hospital system nursing conference. The nurses on the Education Council served as champions of intermittent auscultation and provided assistance to nurses who were not comfortable with the process or documentation.

A pre- and post-quality-improvement-process-measures design was used for evaluation. The post-process-measure outcomes were compared to the pre-process-measure baseline using Fisher's exact test at the significance level

of .05. (VassarStats: website for Statistical Computation, <http://vassarstats.net>).

OUTCOMES

Project outcomes are displayed in Table 1. For the primary goal, the practice's primary cesarean birth rate was decreased from 28.9% to 12.3% in the post-process-measure period. The 57.8% decrease was statistically significant (odds ratio 0.345; 95% confidence interval, 0.249-0.479; $P < .001$).

In the 12-month post-process-measure group, 544 nulliparous women received care from the practice providers and gave birth at Lutheran Medical Center. Of these women, 67 had cesarean births (12.3%). Of these cesarean births, 66 were for arrest of descent or fetal intolerance to labor. One cesarean birth was at patient request due to a previous medical procedure in Iran. For the 4 process measures, all outcomes met goals by the end of the project. For the first process measure, audit and feedback, by the conclusion of the project, 100% of the physician providers had access to their primary cesarean birth rates at electronic medical record login (CNMs are not included, as cesarean births are assigned to the surgeon). For the second process measure, decreasing the use of elective induction, the rate decreased from 15.5% to 2.7%. Of the 13 women who had elective induction of labor, family reasons or patient discomfort were cited as the reason. For the third process measure, 44 of the 54 women who were seen for triage were admitted at greater than or equal to 4 cm dilatation (81%). Eight of the women were admitted because they were in too much pain to go home or were seen several times in triage, and the decision was made to admit them and augment their labor. Two women were admitted because fetal surveillance showed a concerning fetal heart rate. For the final process measure, the measurement was limited to women who never received oxytocin or epidural anesthesia, as this excluded them from intermittent auscultation. Of the 26 women who met the inclusion criteria per the newly written hospital policy, 22 received intermittent auscultation throughout their labor (84.6%).

DISCUSSION

Increasing provider awareness of primary cesarean birth rates and focusing on 3 physiologic birth parameters that have been shown to promote vaginal birth had a positive impact by significantly decreasing the primary cesarean birth rate of a private maternity care practice and, consequently, a community hospital. This decrease helped the practice and the hospital meet national and local benchmark levels for primary cesarean birth rates.

The significant decrease that was seen after initiating this project may speak to the motivation of the team to follow practice guidelines to improve outcomes. The strengths of this project were in its simplicity and the willingness of the team to change the birth culture. The process measures represented evidence-based practices that have been shown to promote vaginal birth by encouraging the natural process of labor and reducing unnecessary interventions. The significant decrease in the primary cesarean birth rate could also be attributed to unmeasured processes. Awareness of efforts to reduce the

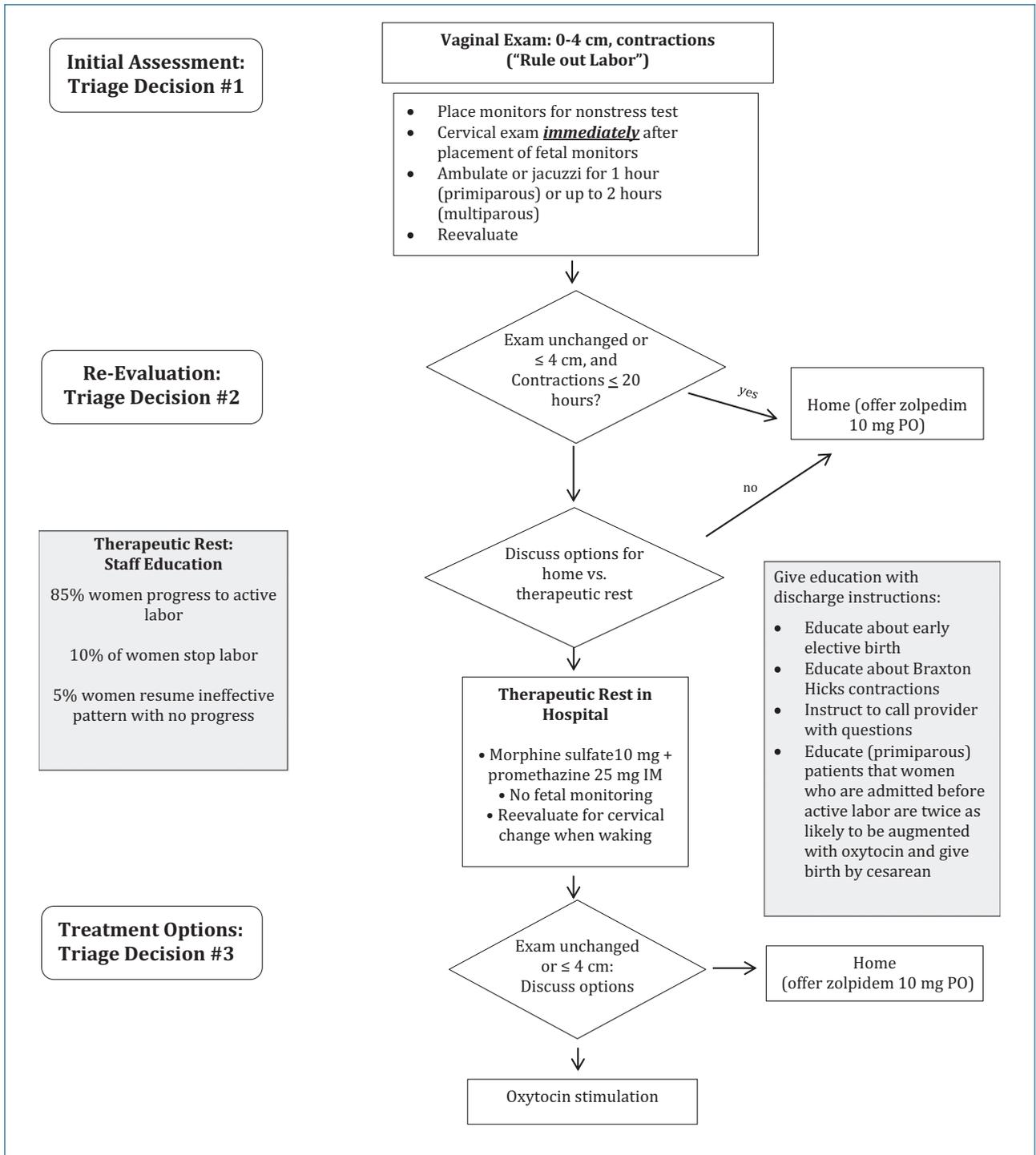


Figure 1. Triage of Term "Rule Out Labor" Women With Single, Vertex Pregnancies

This triage flow sheet was developed to use with the goal of increasing the number of women admitted at greater than or equal to 4 cm.

Sources: Neal,⁸ Austin²⁷

primary cesarean birth rate could have influenced providers to employ other physiologic birth parameters.

Other quality improvement projects aimed at reducing the primary cesarean birth rate in a low-risk population using a similar approach have had mixed results. In 2011, the Perinatal Quality Collaborative of North Carolina used audit and feedback and provider education about physiologic birth parameters to reduce their primary cesarean birth rate by

25% but achieved success only in the group of women with risk factors.²⁴ In Washington State, a multifaceted approach that included audit and feedback with providers and encouragement of physiologic birth parameters led to a decrease in that state's primary cesarean birth rate.²⁵ A meta-analysis for evidence-based strategies to reduce cesarean birth rates found that the most successful programs used a multifaceted approach that included audit and feedback, implementation

Table 1. Synopsis of Primary Goal, Process Measures, Baseline Data, and Outcomes

	Time	Baseline Measurement	Goal	Outcome
Overall Project Goal				
Reduce the primary cesarean birth rate for patients of Westside Women's Care	April 2015-March 2016 (12 months)	28.9%	21.7% (a 25% reduction)	12.2% (a 57.8% reduction)
Process Measures to Achieve Goal				
Audit and feedback: Provider access to cesarean birth rate	April 2015-March 2016 (12 months)	Not previously measured	100% of providers (N = 7)	100%
Elective induction of labor < 41 weeks' gestation	April 2015-March 2016 (12 months)	15.5%	3%	2.4%
Triage to admit people in active labor	July 2015-March 2016 (9 months)	Not previously measured	50% of women meeting inclusion criteria	81%
Intermittent auscultation as standard of monitoring for low-risk women	December 2015-March 2016 (4 months)	Not previously measured	50% of women meeting inclusion criteria	84.6%

of clinical practice guidelines, and identifying barriers to change.¹⁸

The decrease in primary cesarean births that was seen after initiation of the project suggested that provider awareness of their rates might have caused them to modify their practices to reduce the use of cesarean birth. This improvement in practice is consistent with a review of 140 studies looking at audit and feedback alone and in combination with quality improvement strategies.¹⁹

Promoting physiologic birth means reducing the use of interventions and stopping the cascade that can follow, leading to more interventions and often surgery. Reducing the first intervention, elective induction of labor before 41 weeks' gestation (40 full weeks of pregnancy), can help stop or slow down this cascade without compromising outcomes. Following the guidelines of maternity care professional organizations,^{1,5,7,13,14,21,26} Westside Women's Care was able to reduce their rate of elective induction by 82.6%. Once the expectation was set that it was the policy of the providers to not discuss elective induction of labor until a woman is at least 41 weeks' gestation, the practice was reduced with patient acceptance.

The next process measure, awaiting active labor before admitting women to the labor and delivery unit, also reduced the use of unnecessary interventions.^{5,7,8} In the past, the nurses and providers were inconsistent when choosing to admit women who reported contractions or send them home to await active labor. The triage flow sheet provided guidelines to make this process more efficient and consistent. The flow sheet also supplied the nurses with tools to help advise women on managing early labor at home or on the labor and delivery unit.

The final process measure, increasing the use of intermittent auscultation, challenged the nurses and providers to expand their comfort zone. Information from the pre-process-measure survey that showed providers supported intermittent auscultation if it was used following a guideline, allowed the team to empower and educate the nurses

that this was a safe fetal monitoring option for low-risk women.⁹⁻¹²

While process measures outcomes were reported only for Westside Women's Care, audit and feedback were provided to all the medical center obstetricians. The triage flow sheet and intermittent auscultation were used with all patients who presented to the unit regardless of provider affiliation. Any of these process measures could be used on a hospital labor and delivery unit with support from their obstetricians or CNMs. The process measures were also cost effective. The Education Council meets monthly and took on the project from April 2015 to March 2016, not adding any further cost to the labor and delivery unit. The nursing education took place during times when the nurses already had education (the morning huddle and annual nursing conferences). The only costs incurred included the purchase of 3 new Dopplers (\$2,250) to facilitate intermittent auscultation.

Limitations

The project included 994 women (450 in the pre-process-measure group and 544 in the post-process-measure group). The success of the project cannot be completely attributed to the process measures; however, their clinical significance for the practice cannot be debated.

Although the project employed evidence-based process measures that have been shown to promote vaginal birth and reduce the primary cesarean birth per extensive literature review, it may not be generalizable to other practice settings because it was planned and implemented for the project. Practices with a different mix of providers, level of patient acuity, and/or level of motivation may change results.

Future evaluation of the project should include 1) a retrospective measurement of neonatal outcomes including admissions to the neonatal intensive care unit, Apgar scores, and fetal cord blood gases; 2) a retrospective review of an increased use of forceps or vacuum to facilitate birth; 3) a retrospective review of maternal outcomes including laceration

type and postpartum hemorrhage; and 4) a survey of staff and patients measuring satisfaction related to these process measures.

The hospital has maintained a primary cesarean birth rate less than 15% since the conclusion of the project. The rate is reported monthly at the obstetric section meeting in the hopes that the primary cesarean birth reduction efforts will be sustainable.

CONCLUSION

A quality improvement project focusing on audit and feedback and increased use of management practices that have been shown to promote vaginal birth had a statistically significant impact on the primary cesarean birth rate of a single provider group at a community hospital. The organized effort included a highly motivated hospital staff and a willing provider group who were open to complying with previously underutilized clinical practice guidelines. The results of the project suggest that this shift in approach to labor and birth will decrease the primary cesarean birth rate without compromising outcomes.

AUTHORS

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CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's Web site:

Appendix S1. Intermittent Auscultation of the Fetal Heart Rate. The policy that was created and approved by all obstetrics providers at Lutheran Medical Center to increase the use of intermittent auscultation as opposed to continuous fetal monitoring.

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