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**The Use of a Peanut Ball During Labor in Nulliparous Term Singleton Vertex Pregnancies to Decrease the Primary Cesarean Rate: An Evidence-Based Practice Improvement Project**

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### Abstract

**BACKGROUND:** Current statistics indicate cesarean section rates in nulliparous term singleton vertex (NTSV) pregnancies, a singleton first pregnancy  $\geq 37$  weeks gestation in a vertex position, of 32.8% and rising. A peanut ball, a tool used to optimize pelvic opening and fetal head rotation, can decrease labor length and cesarean section rates. The aim of this evidence-based practice improvement project was to reduce the cesarean rate in NTSV pregnancies by 1% within three months. The project occurred in an urban 12-bed labor and delivery unit in Middle Tennessee. Participants included laboring women meeting NTSV criteria. **METHOD:** Plan- do- study- act cycles were used, following Levin's EBPI framework. Baseline NTSV cesarean rates were collected before implementation. Review of the literature identified labor support tools and staff education methods. **INTERVENTION:** Staff received education through a certified peanut ball instructor. Nurses' knowledge of the peanut ball, frequency of use, and confidence using the peanut ball were measured before and after education. Data collection was performed through nurse reports using pre-formatted worksheets ( $N = 103$ ). **RESULTS:** The hospital NTSV cesarean section rate rose by 2.6% from 24.7% to 27.3% over the project period, not meeting the 1% reduction aim. Eighty-seven women used the peanut ball during labor, 81.6% delivered vaginally, and 18.4% had a cesarean section. Use of the peanut ball in the project group did not have a significant change in the cesarean rate from the hospital rate ( $p = .072$ ), but clinical significance cannot be disregarded. Nurses' knowledge ( $p < .001$ ), frequency of use ( $p = .018$ ), and confidence using the peanut ball ( $p = .044$ ) all significantly increased after education. **CONCLUSION:** The peanut ball is a valuable labor support tool that may reduce the risk of cesarean birth. Education poses significant benefits, including greater staff confidence, knowledge, and increased frequency of peanut ball use.

*Keywords:* peanut ball, labor support, cesarean section, NTSV, length of labor, education, pelvic opening, quality improvement

## **The Use of a Peanut Ball During Labor in Nulliparous Term Singleton Vertex Pregnancies to Decrease the Primary Cesarean Rate: An Evidence-Based Practice Improvement Project**

For many years the cesarean section rate has been on the rise. This consistent upward trend has made a cesarean section the most commonly performed surgical procedure in the United States (Boyle et al., 2013). The cesarean section rate peaked at 32.9% in 2009, after climbing each year since 1996 where the cesarean rate was only 20.7%. According to the National Vital Statistics Report, in 2017 the cesarean rate climbed again to 32.9%, which was the first increase in cesarean rates since the peak in 2009 (Centers for Disease Control and Prevention [CDC], 2018). In a study by Barber et al. (2011), primary cesarean sections were responsible for 50% of the increase between 2003-2009. The current cesarean section rate for 2018 was reported at 31.9%. Although this slightly decreased from the previous year, it remains higher than the Healthy People 2020 goal of 23.9% (National Vital Statistics Report, 2019).

### **Problem Description**

A cesarean section is major abdominal surgery that poses threats to both mother and the neonate. Maternal risks include damage to surrounding internal structures, infection, anesthesia complications, and an extended period of postpartum recovery (Tussey et al., 2015). Cesarean delivery also increases the risk of subsequent uterine rupture, placenta accreta, hemorrhage, hysterectomy, and death in future pregnancies (Boyle et al., 2013). Neonates are also affected by the surgical delivery as they may suffer complications such as inadequate breastfeeding, respiratory complications, and neonatal intensive care admissions (Bell et al., 2017). The need for transitional respiratory assistance after birth is increased since the neonate does not benefit from passing through the birth canal, which improves amniotic fluid removal (Tussey et al., 2015).

Failure to progress in labor, also termed labor dystocia or arrest of labor, is one of the most prevalent complications attributing to the rising cesarean rate in the United States (Roth et al., 2016). Nearly one-third of cesarean sections are performed due to failure to progress (American Pregnancy Association, 2019). A major causative factor identified for failure to progress is immobility during labor. Maternal movement and position changes throughout labor are essential to facilitate fetal descent and rotation through the pelvis (Zwelling, 2010). Epidural anesthesia and high body mass index (BMI) cause maternal movement to be exceptionally more difficult, thus associated with fetal malposition and increased length of labor (Eriksen, Nohr, & Kjaergarrd, 2011). The nursing team's lack of knowledge related to the importance of mobility and positioning to promote labor is another presenting factor to consider. This combined poor knowledge base contributes to labor dystocia and the rising rate of cesarean section deliveries (Grant, 2015; Zwelling, 2010).

### **Available Knowledge**

#### **Importance of Labor Support**

Increasing women's access to nonmedical interventions throughout labor, such as continuous labor support, has been shown to reduce cesarean birth rates (American College of Obstetricians and Gynecologists [ACOG], 2014). Labor support is defined by Sauls (2004) as, "The intentional human interaction between the intrapartum nurse and the laboring woman that assists the client to cope in a positive manner during the process of giving birth" (p.125). Labor support is broken down into four categories including physical, emotional, informational, and advocacy. The physical support category includes correct positioning in relation to stage of labor (Adams & Bianchi, 2008). Proper positioning throughout labor can reduce pain, increase contraction strength, and prevent the likelihood of perineal trauma at delivery. Positions that

mimic the squatting position, thus opening the pelvic outlet, allow for fetal descent and rotation into the maternal pelvis (Adams & Bianchi, 2008). The Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) encourages continuous labor support techniques to promote maternal outcomes including spontaneous vaginal birth, shorter length of labor, decreased operative birth, and decreased cesarean birth (AWHONN, 2018).

### **Peanut Ball**

Birthing tools and positions to decrease labor length and promote comfort throughout the labor process have been utilized since the 1990s. Peanut balls are the newest member of this collection of positioning tools. These latex-free inflated exercise balls are shaped similar to a peanut shell so that the ball may be placed between the laboring woman's legs. Since each patient is unique, the peanut balls come in various sizes to ensure a proper fit for the designated user (Roth et al., 2016). There are seven basic peanut ball positions, although Grant (2015) has listed up 14 advanced positions. Each position can be altered to promote external or internal hip rotation based on fetal station and stage of labor by adjusting the patient's foot placement. According to Tussey et al. (2015), "The ball promotes spinal flexion, increasing the uterospinal angle, and increasing the pelvic diameters to facilitate occiput posterior rotation, which results in a widened pelvic outlet" (p. 17). For women with dilation of four centimeters or less at the time of epidural placement, the likelihood of vaginal birth was 61% higher when using the peanut ball compared to those women who received their epidural at the same point and did not use the peanut ball (Hickey & Savage, 2019). Therefore, implementing the peanut ball in the latent phase of labor, defined as 0-5 cm dilation, with an epidural may improve the chances of vaginal birth. Correct peanut ball use is recognized to decrease first stage labor by 90 minutes, second stage labor by 22 minutes, and lowers the cesarean rate by 12% (Grant, 2015). Hickey and

Savage (2019) showed a 50% decrease in a woman's risk for having a cesarean section when using the peanut ball.

### **Staff Knowledge**

A common theme found in the literature was the lack of knowledge on using the peanut ball among healthcare team members. One researcher provided both nurses and providers education on contemporary labor management, safety, and labor support techniques before implementing a peanut ball. The researcher suggested implementing an education bundle to staff significantly increased peanut ball use on the labor and delivery unit (Bell et al., 2017).

Knowledge of proper positioning in the seven basic positions, sizing patients based on their position and height, and ensuring proper foot and knee alignment for pelvic opening related to internal or external rotation are all largely influential of correct peanut ball use. Incorrect use poses no benefit to using the peanut ball; therefore, staff education is vital for successful outcomes (Grant, 2015).

### **Rationale**

Levin's Evidence-Based Practice Improvement (EBPI) model was selected to guide this project. This model is unique as it combines both the steps of the evidence-based practice (EBP) process along with quality improvement (QI) methods. By merging these models, a more effective and practical approach to achieving quality goals may be obtained (Levin et al., 2010). The initial steps of the EBP process include search and critical appraisal of the research literature to determine the best approach for implementing a practice change. The QI method involves developing an aim statement to determine if improvement in outcomes occurs after implementing a practice change. By combining EBP and QI, a recommended intervention is



steeped in evidence to guide successful practice change. Small tests of change through plan- do- study- act (PDSA) cycles cultivate the practice change process (Langely, et al., 2009).

The population of interest includes low-risk nulliparous, term, singleton, vertex pregnancies (NTSV). Low-risk is defined as a vertex, or head down, position singleton fetus greater than or equal to 37 weeks of gestation (Office of Disease Prevention and Health Promotion [ODPHP], 2019). Risk factors may exist accompanying the NTSV criteria and could increase the risk for cesarean section. Identified risk during the perinatal period includes, but is not limited to, gestational diabetes (GDM), diabetes mellitus type one (GDM1), diabetes mellitus type two (GDM2), pre-eclampsia, eclampsia, gestational hypertension (GHTN), chronic hypertension (CHTN), chorioamnionitis, maternal substance abuse, or any other identified maternal comorbidity. Women with these risk factors were included in the project since they are not excluded from the NTSV criteria (ODPHP, 2019).

### **PICOT Question**

The development of a Population-Intervention-Comparison-Outcome-Time (PICOT) question drove the systematic review of the literature. The PICOT question for this project was, “In nulliparous term singleton vertex pregnancies, how does the use of a peanut ball when compared to no use of a peanut ball in labor affect the cesarean section rate over three months?”

### **Evidence Search and Appraisal**

The databases used to search for supporting background literature included PubMed, CINAHL, Scopus, Cochrane for Systematic Reviews, and Google Scholar. Elements from the PICOT question prioritized keyword selection. Articles retrieved for review must have met required inclusion criteria written in the English language, peer reviewed, published within the last 15 years, and utilized the intervention of a peanut ball with the cesarean rate as an outcome.

Keywords and search format used, including Boolean connectors, included “labor”, “peanut ball”, “birthing tool”, “birth”, “labor support”, “cesarean section”, “cesarean”, “c-section”, (peanut ball) AND (labor), and (pregnan\* OR labor\* OR birth\*) AND ("peanut ball" OR "peanut birthing ball"). Results were saved using the National Center for Biotechnology Information (NCBI) resource.

After searching the above databases, a total of 201 hits were achieved. Twenty-two articles included elements of the PICOT question and were thus pertinent for abstract review. A total of 18 articles met inclusion criteria after non-full text articles were removed. Eight articles remained for critical appraisal after removing duplicates and pilot studies. Expert opinions were also collected via phone consultation and in-person interview methods. Critical appraisal was performed on the remaining eight articles using the Johns Hopkins Nursing Evidence-Based Practice Research Evidence Appraisal Tool (Dang & Dearholt, 2018) to reach a total of five pertinent articles.

### **Synthesis of Evidence**

A synthesis table combining individual studies is shown in Table 1. Each article was given a level of evidence and quality rating using the Johns Hopkins Nursing Evidence-Based Practice Model Level and Quality Guidelines (Dang & Dearholt, 2018). Once synthesized, the project's overall recommendations, including the strengths of recommendations, were rated using the Johns Hopkins Nursing Evidence-Based Practice Model Synthesis Process and Recommendations Tool (Dang & Dearholt, 2018).

Overall, the consensus was that peanut balls should be considered for nulliparous women to promote a vaginal birth (Bell et al., 2017; Hickey & Savage, 2019; Mercer & Kwan, 2018;

**Table 1***Synthesis of Evidence Table*

Outcome	Bell et al., 2017 #1	Mercier & Kwan, 2018 #2	Roth et al., 2016 #3	Tussey et al., 2015 #4	Hickey & Savage, 2019 #5
Cesarean section rate	↓ <sup>sc</sup>	+	↓ <sup>c</sup>	↓ <sup>sc</sup>	↓ <sup>c</sup>
Length of first stage labor	∅	∅	↓ <sup>sc</sup>	↓ <sup>sc</sup>	+
Length of second stage labor	∅	↓ <sup>c</sup>	+	↓ <sup>sc</sup>	+
Sample Size	401 patients	86 patients	200 patients	201 patients	343 patients
Population	Nulliparous, term, singleton pregnant women	Nulliparous women with singleton pregnancy in active labor	Women >/= 39 weeks seeking elective IOL with an epidural	Laboring women with an epidural	Women >18 years old, receiving epidural, >/=37 weeks gestation, vertex position
Study Design	Quality Improvement Project	RCT	RCT	RCT	Quasi Experimental Group Design
Level of Evidence	V	I	I	I	II
Quality of Evidence	A	B	B	A	A
Any other information important to the PICOT question	Percentage of PB use ↑ <sup>c</sup>	More women with PB use did reach full dilation than without PB ball <sup>c</sup>			PB ↓ risk of cesarean section by 50% <sup>sc</sup>

Legend: ↓=decrease; ↑=increase; ∅=not discussed in study; s=statistical significance; c=clinical significance; + = no difference; RCT= Randomized control trial; PB= peanut ball; IOL= induction of labor. *Johns Hopkins Nursing Evidence- Based Practice Model* used for level of evidence and quality rating. (The Johns Hopkins Hospital/ Johns Hopkins University School of Nursing, 2017) <https://www.ijhn-education.org/content/johns-hopkins-nursing-evidence-based-practice-model-and-tools>

Roth et al., 2016; Tussey et al., 2015). Bell et al. (2017) suggests implementing an education bundle to increase peanut ball use. Hickey and Savage (2019) also suggest that peanut ball use when an epidural is placed in the latent phase of labor improves the likelihood of vaginal birth. Grant (2015) suggests that both the first and second stage of labor are decreased with peanut ball use, along with the overall cesarean section rate.

### **Specific Aims**

The aim of this project was to improve the outcomes of women with NTSV pregnancies by using a peanut ball to decrease the rate of cesarean sections by 1% over three months. Secondary aims were to strengthen the labor and delivery nurses' knowledge and use of the of the peanut ball, improve fetal head rotation to the occiput anterior position at delivery, and shorten the total length of labor.

### **Methods**

#### **Setting**

The project took place at an urban hospital in Middle Tennessee which comprises 12 labor and delivery suites. The hospital delivers approximately 300 babies per month, 90-100 of those meeting the NTSV criteria. The hospital did have peanut balls before this practice improvement project. However, structured education on the peanut ball's correct use had not been provided to staff. After discussions with the nurse manager and staff nurses, it was discovered there were not enough peanut balls available throughout the labor unit to ensure each patient had access to one. A Safe Birth Initiatives (SBI) committee was present at the facility during the implementation period. The SBI committee utilized other quality improvement initiatives in conjunction with the peanut ball intervention to reduce the NTSV cesarean rate.

**Ethical Considerations**

A letter of support was obtained from the facility before beginning this project. Approval for this project was sought from the University of Tennessee (UT) Institutional Review Board (IRB). The IRB, or research ethics committee, is established to protect the rights and welfare of human research subjects participating in research activities conducted under the institution with which it is affiliated (Grady, 2015). After evaluation, the IRB deemed this evidence-based practice improvement project as exempt from review.

**Key Stakeholders**

The project was presented to the SBI committee to obtain buy-in from the team's stakeholders, including physicians, nurses, and leadership staff. The Centricity Perinatal (CPN) Analyst played a vital role in providing updated NTSV cesarean rate statistics. The analyst was the sole individual who had access to the CPN charting system and Tableau data required for analysis.

**Interventions**

Before implementing the peanut ball on the unit, an educational training session that included a hands-on skills portion was conducted for all labor and delivery nursing staff by a certified peanut ball instructor. Staff who could not attend the in-person sessions were to view the video version posted on the unit's private social media account. All new staff and float nurses were also provided access to the training video for their knowledge. The peanut ball education sessions occurred over one week, with each session lasting approximately 30 minutes. The certified peanut ball trainer selected time frames to include both dayshift and nightshift hours. Staff were instructed to drop-in to one educational session or review the training video by the conclusion of the week. In the education sessions, peanut ball background research with clinical

benefits, seven basic positions, proper sizing, cleaning, storage, contraindications of use, reviewing the data collection worksheets, position posters, and the data collection process were taught. Nurses were taught which positions to use in correlation with the stage of labor, fetal head position, and fetal station to promote the best outcome with the peanut ball tool. The education sessions were aimed at the nursing staff, but several physicians and nurse leaders chose to attend.

Physician and provider buy-in was a key concern from nursing staff. The certified peanut ball instructor and project lead presented the practice improvement project to the SBI. The department chair for OBGYN physicians was included in the meeting and agreed that providers should be included in the education and training. All providers were sent an email containing a brief overview of the peanut ball, including research literature, the training video link, and a summary of the practice improvement project.

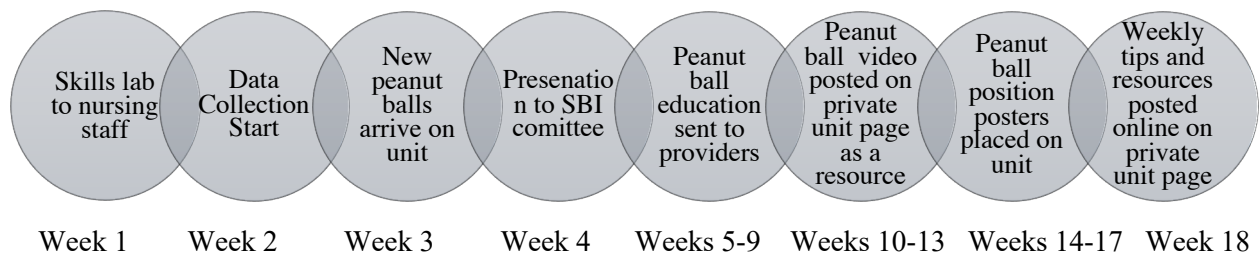
Before implementation, it was noted there were not enough peanut balls to ensure each labor room when at capacity, had an available peanut ball. Nine additional peanut balls were purchased to equal 18 on the unit, with the majority being the most common size- medium. Peanut ball position posters were used frequently by the staff. The facility purchased 20 downloadable peanut ball position posters as a visual to assist the staff in accurate positioning. The posters were then laminated and placed in each labor room, with extra copies remaining at the nursing station. Weekly updates with peanut ball information, articles, videos, and positioning tips were posted on the private unit social media page by the project lead. The project lead remained on the SBI committee and provided project updates to both SBI and the OBGYN department at their respective meetings.

### Study of Intervention

Seven PDSA cycles were completed over the four-month implementation period of the peanut ball intervention. Beyond physical data collection worksheets, the project lead made frequent rounds on the unit to interview nursing staff, providers, and leadership staff to gain insight and evaluate each PDSA cycle. Staff input and engagement played a large role the initiation of each new PDSA cycle, shown in Figure 1.

**Figure 1**

*Plan- Do- Study- Act Cycle Diagram*



Nursing staff completed an anonymous pre-knowledge evaluation before the training session. The evaluation asked staff to rate their knowledge of the peanut ball, confidence using the peanut ball, and how frequently they utilized the peanut ball for their patients on a scale of 0 to 10, with 10 being the most and 0 being the least. The same evaluations were collected anonymously via an online survey and in-person collection four weeks after completing the educational training. The questions were the same as the pre-evaluation, with the addition of asking staff if they felt the peanut ball education was helpful and a place for additional comments.

Data collection was nurse-driven by completing a one-page pre-formatted worksheet with no patient identifiers placed on each chart. Since the project lead was unable to extract data from the

electronic health record, nurses were instructed to fill out pertinent patient information contained on the worksheet. Patient information requested included:

- maternal age
- maternal BMI
- if the patient met NTSV criteria (with the definition provided) (yes/no)
- the method of delivery (vaginal or cesarean section)
- the length of labor in minutes (with the start of labor definition provided)
- the fetal head position at delivery
- if the patient received an epidural (yes/no)
- when the patient received their epidural (less than or equal to 4 centimeters or greater than 4 centimeters)
- a list of risk factors for the nurse to circle if present or write in if other risk factors were identified but not listed.

Instructions outlining how to complete the data collection worksheet and where to place the completed worksheet were provided at the top of the worksheet page.

### **Data Collection**

Data collection started May 24, 2020 and continued through September 30, 2020.

Although the original plan was to collect data over three months, the project lead determined after three months to proceed for an additional month to obtain more data. Data collection worksheets were placed on every patient admission packet during the implementation period.

Throughout labor, the worksheet remained on the patient's chart. After delivery, the nurse placed the completed worksheet in a locked box located at the nursing station. The project lead was the sole individual with access to the locked box. Completing the worksheet for data collection was



reviewed with nursing staff during peanut ball education. The project lead retrieved the worksheets monthly and manually entered the data into a password-protected Microsoft Excel spreadsheet. All data collection worksheets were shredded at the conclusion of the project.

### **Outcome Measures**

The primary outcome measures to determine the success of the intervention coincide with the aims of this project, which included (a) improve the outcomes of women with NTSV pregnancies by using a peanut ball to decrease the rate of cesarean sections by 1% over three months, (b) strengthen nurse knowledge, confidence, and frequency in use of the of the peanut ball, (c) improve fetal head rotation to the occiput anterior position at delivery, and (d) shorten the total length of labor.

### **Data Analysis**

The SPSS software version 26 was used for statistical analysis of collected data. Descriptive statistics were used to exhibit the demographics of age, BMI, and if a maternal risk factor was present. Chi-Square tests were used to determine if a statistical difference was present when using a peanut ball in the delivery method, fetal head position at delivery, and delivery method with an epidural in the latent phase of labor. An independent samples t-test was used to examine the difference in nurses' knowledge, confidence, and frequency of use related to the peanut ball after education. An additional independent samples t-test was utilized to identify differences in length of labor when using a peanut ball.

In-house calculations by the CPN analyst and the Tableau platform provided the NTSV cesarean rates monthly and quarterly. Tableau is an analytic data platform used by the hospital to extrapolate outcome measures. Since data is extracted off nursing documentation, occasionally there are errors as the computer can only work with the information provided to it. The in-house

hospital data allows for more accuracy as the CPN analyst is reviewing every chart and may catch documentation errors.

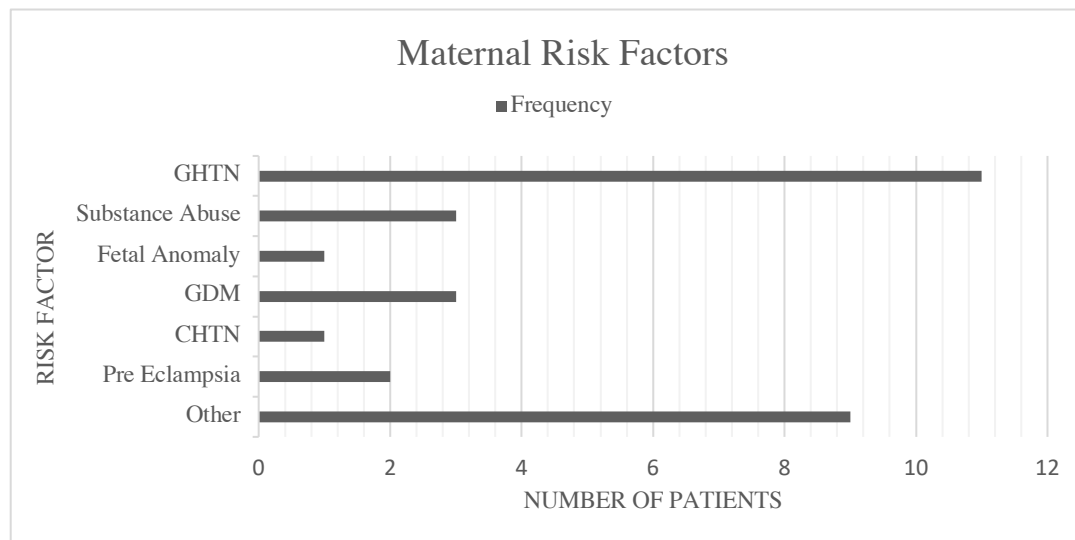
## **Results**

### **Demographics**

Three hundred and fifty-one NTSV deliveries occurred on the labor and delivery unit preceding project implementation from January through April 2020, compared to 459 NTSV deliveries from May through September 2020. A total of 113 data collection worksheets were obtained throughout the four-month project period. Ten worksheets did not answer the method of delivery and were excluded from analysis ( $N= 103$ ). The mean maternal age of the sample was 26.22 years ( $SD = 5.5$ ) with a mean BMI of 31.07 ( $SD = 6.2$ ). No further demographics were collected on the patient population to provide patient anonymity. Risk factors were present in 23.9% of patients ( $n = 27$ ) shown in Figure 2. The result of “other” included risk factors such as obesity and limited prenatal care. The baseline NTSV cesarean section rate on the labor and delivery unit prior to beginning the project (January 1, 2020 through May 24, 2020) was 24.7% per Tableau.

### **Hospital NTSV Cesarean Section Rate**

The specific aim for this project was to decrease the hospital NTSV cesarean rate by 1% over three months. The hospital NTSV cesarean section rate, as provided by the Tableau platform, rose by 2.6% from 24.7% to 27.3% over the project period, not meeting the 1% reduction aim. Therefore, a closer look was taken at the hospital’s NTSV cesarean section goal. The NTSV cesarean section rate goal for the facility was to meet the Healthy People 2020 goal of 23.9%. The overall hospital NTSV cesarean section rate during the project implementation period was 27.3% (May 24, 2020- September 30, 2020). Since this did not meet

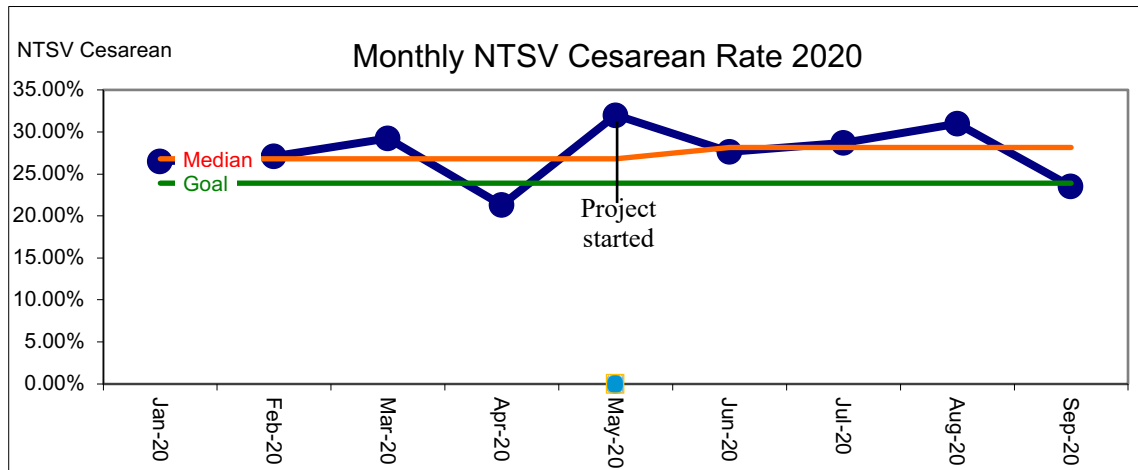
**Figure 2***Maternal Risk Factors*

Note. GHTN-gestational hypertension; GDM-gestational diabetes mellitus; CHTN-chronic hypertension

the hospital's goal of 23.9%, monthly cesarean rates shown in Figure 3 were explored and compared to the Healthy People 2020 goal. The final month of implementation, September 2020, met this goal with an in-house calculated NTSV cesarean rate of 23.5%, which demonstrates a decrease compared to the pre-project cesarean section rates. While the peanut ball intervention may have contributed to this reduction, a direct attribution in meeting the hospital NTSV cesarean section rate goal cannot be assumed.

### **Peanut Ball Group NTSV Cesarean Section Rate**

The significance of peanut ball use on the outcome of NTSV cesarean section rate was analyzed. Eighty-seven women out of 103 used the peanut ball during labor. Of those 87 women who used the peanut ball during labor, 81.6% delivered vaginally and 18.4% had a cesarean section. Use of the peanut ball in the project group did not have a significant change in the cesarean rate from the hospital rate during the project period ( $p = .072$ ). Clinical significance

**Figure 3***Monthly NTSV Cesarean Rate Chart*

cannot be disregarded as there is a difference between the hospital Tableau rate (27.3%) and the peanut ball group cesarean rate (18.4%) during the project period.

### Secondary Outcome Measures

Fetal head position at delivery was occiput anterior (OA) in 89.5% of patients ( $n = 68$ ) in women using the peanut ball. Unfortunately, pre-project fetal head position data was not available for comparison thus improvement could not be measured for this aim. Over three fourths (79.3%) of patients who received an epidural at four centimeters or less dilation and used a peanut ball delivered vaginally ( $n = 46$ ), whereas 20.7% delivered via cesarean section ( $n = 12$ ). There was no significant difference ( $p = .319$ ) in length of labor for women who used a peanut ball or not.

### Nurse Education

After receiving education with a certified peanut ball instructor, nurses' knowledge of the peanut ball ( $p < .001$ ), confidence using the peanut ball ( $p = .044$ ), and frequency using the peanut ball ( $p = .018$ ) all significantly increased.

## **Discussion**

### **Comparison of Findings**

The project findings regarding the significant benefit of peanut ball education were congruent with the literature (Bell et al. 2017). Although this project did not find statistical significance, the clinical significance of peanut ball use decreasing the NTSV cesarean rate also corresponds with previous studies (Bell et al., 2017; Hickey & Savage 2019; Roth et al., 2016; Tussey et al., 2015).

### **Implications for Practice**

The peanut ball is a nurse-driven, low-risk labor support tool. When used correctly, the peanut ball allows for the internal and external rotation of the maternal pelvis, thus encouraging fetal descent and rotation and promoting labor progress. Patients are frequently immobile due to epidural anesthesia and high BMI; the peanut ball allows for mobility while remaining in bed. As this is a nurse-driven intervention, a provider order is not necessary. Maintaining competency in using the peanut ball is sustainable as more evidence continues to evolve on the benefits of the peanut ball as a labor support tool, and resources are easily accessible. Certified peanut ball trainers, peanut ball ambassadors, video trainings, and advanced peanut ball information are all available at the facility's discretion for continued learning and resources.

### **Project Limitations**

Strengths such as access to a diverse population of women representative of an urban metropolitan area, collaboration with the SBI committee, high possibility of sustainability, presence of a low-risk nurse-driven intervention, and representation of multiple provider teams, were all present throughout the project. Though strengths were present, several limitations were

also noted. The implementation period was during the COVID-19 pandemic, thus creating numerous challenges.

The novel COVID-19 pandemic vastly affected the hospital setting where the quality improvement project took place. The hospital became a designated COVID-19 transfer hospital and a higher level of care facility within both the hospital's division and among private facilities in the greater area of middle Tennessee. The hospital provided care to COVID positive patients on a separate unit, which accepted patients from 18 other hospitals. The facility was one of two private hospitals in the area which offered extracorporeal membrane oxygenation (ECMO). Due to these advanced capabilities, the facility saw an increase in high-risk obstetrical (OB) patients. COVID-19 positive patients were included in the high-risk OB category and other delivered patients who had complications or risks associated with their delivery. This project's data collection began at the peak of high-risk OB cases (May 2020) and coincided with the third COVID-19 surge in Tennessee (June 2020). High-risk OB deliveries remained higher than average throughout the project period, and the surge of COVID-19 positive patients within the state of Tennessee continued climbing throughout the remainder of 2020. Neonatal Intensive Care Unit (NICU) admissions also increased during the project's timeframe, correlating with the increased high-risk OB deliveries and COVID-19 positive surge numbers. Of note, scheduled elective cesarean sections were postponed for one month, thus showing the decrease in NTSV cesarean section rates for April of 2020.

Although this quality improvement project's results imply a significant change in nurse's culture and knowledge relating to the peanut ball, it is hard to determine the overall impact due to the extenuating circumstances of the COVID-19 pandemic. It is worthy of recognizing that

during a global pandemic, the project lead was able to successfully complete the project despite the overarching challenges encountered. Examples of such factors include:

- Nursing staff education: despite regulations for social distancing which, canceled scheduled educational courses, the project lead could conduct drop-in skills sessions during the nurse's shift providing peanut ball education and training to nursing staff along with video education means.
- Environment: with the new COVID-19 positive floor opening, supplies were shifted to meet needs where applicable. Due to the purchasing of new peanut balls for the unit, nurses provided their patients with this labor support tool on both the labor and delivery floor and the COVID-19 positive floor.
- Culture: due to the education, project advocacy to providers, peanut ball posters, video education, and continued online resources, the staff were still able to shift the culture around the proper use of the peanut ball as a norm on the labor unit.
- Community: during this frightening time for patients within the community, continuous labor support was still provided to patients no matter if they were COVID-19 positive or not. The peanut ball was one of the labor support tools utilized by nursing staff, along with position posters so staff could communicate and show patients the positions they would be using to help ease anxiety while promoting labor.
- NTSV Cesarean Section Rate: Despite a rise in high-risk OB deliveries, in September 2020, the monthly NTSV cesarean section rate (23.5%) met the facility and Healthy People 2020 goal of 23.9%.

An additional barrier encountered was the inability of the project lead to access the electronic medical record. Due to this barrier, the data collection was self-reported by the nursing staff. Self-reported data allows for potential bias, incomplete reporting, and missing data collection forms. Retrospective chart reviews were not allowed to be performed at the discretion of the hospital. When comparing the NTSV cesarean section rate from Tableau during the project period, it was not possible to extrapolate only those that used a peanut ball. Three hundred and fifty- six NTSV deliveries were not accounted for regarding peanut ball use as only 103 collected data worksheets conveyed if the peanut ball was used during labor throughout the project period. Therefore, there could be more women that used a peanut ball but were not accounted for. Lastly, there was no way to capture which peanut ball positions nurses selected based on the fetal head position, fetal station, and cervical dilation. If these data had been available, an analysis could have been conducted to determine if the peanut ball position chosen correlated with labor progression.

### **Future Implications**

Future projects should consider a more robust approach to the collection of outcome measures throughout project implementation. Suggested outcome measures include:

- exact peanut ball positions used in relation to labor progress
- size of peanut ball used in correspondence with patient height and position
- fetal head position throughout labor
- length of time the peanut ball was used.
- patient satisfaction with peanut ball use

A more in-depth education session with a certified peanut ball trainer is also recommended.



### **Conclusion**

As the cesarean section rate in the United States continues to climb, labor tools to aid in mobility and pelvic opening during labor for NTSV pregnancies are essential. The peanut ball is a low-risk, nurse-driven intervention shown in previous studies to be clinically significant in promoting vaginal birth and reducing NTSV cesarean section rates (Bell et al., 2017; Grant, 2015; Hickey & Savage, 2019; Mercier & Kwan, 2018; Roth et al., 2016; Tussey et al., 2015), similar to this project's findings. Education to nursing and provider staff is necessary to promote buy-in from the entire team and ensure the peanut ball is being used correctly. This project's findings showed that even brief educational training sessions and concurrent video education added significant benefits, including greater staff confidence and knowledge and increased frequency of peanut ball use on the labor and delivery unit which corresponds with Bell et al., (2017). Correct use of the peanut ball along with other labor support strategies and birth initiatives pose great potential in extinguishing the rising cesarean rate and promoting better outcomes for NTSV pregnancies.

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