7-2024

Reducing Cesarean Sections with Peanut Ball Use: A Quality Improvement Project

Alexi Rivera BSN, RN
Sacred Heart University

Reducing Cesarean Sections with Peanut Ball Use: A Quality Improvement Project

Alexi Rivera BSN, RN

A DNP project submitted in partial fulfillment of the requirements for the degree of

Doctor of Nursing Practice

Geraldine Budd PhD, APRN, FAANP

Jennette Morgan CNM, MSN

Sacred Heart University Davis & Henley College of Nursing

July 2024

Approval Page

This is to certify that the DNP Project Final Report by Alexi Rivera BSN, RN

has been approved by the DNP Project Team on July 20, 2024

for the Doctor of Nursing Practice degree

DNP Project Faculty Advisor: Geraldine Budd PhD, APRN, FAANP

Practice Mentor: Jennette Morgan CNM, MSN

Acknowledgements

As a first-generation college graduate, I would have never thought I would obtain a terminal doctorate degree. However, with the love and support of my family and friends, I have accomplished a great feat. I would like to acknowledge the following people who helped me along the way:

- My mom and dad, because I do not know where I would be without the loving guidance of you two.
- My boyfriend David, who has stood by my side for ten years and been there cheering me on for three graduations within that time.
- My project mentor Jennette, who was the first person to fight for the peanut balls and helped me even while in her third trimester of pregnancy.
- My unit educator Nicole, who was my partner in crime with the official peanut ball education and implementation.
- And my faculty advisor Dr. Budd, who guided me every step of the way and always remained positive despite many setbacks.

Contents

Abstract ……...6

Problem Identification and Evidence Review ……7

Description of the Local Problem ……...8

Clinical Questions ……...9

Methods for Gathering External and Internal Evidence …….....9

Search Results ……...10

Evidence Appraisal Summary, Synthesis, and Recommendations ……...11

Project Plan ……...12

Project Goals ……12

Framework ……...……12

Context ……..13

Project Team and Roles ……14

Key Stakeholders, Staff, and Buy-in ……14

Description of Practice Change ……...…….14

Evaluation Plan ……16

Barriers to Implementation and Sustainability with Mitigation Plan ……..……17

Timeline ……..……..……17

Resources/Budget ……18

Dissemination Plan ……..……19

Ethical Review ……..19

Project Implementation ……19

Evaluation/Results ……...…….22

Goals and Achievement ……...…….24

Key lessons learned ……...25

Sustainability …….26

Dissemination ……..…….27

Implications of Results ……..……..…….27

References …….28

Appendices ……...…….32

List of Tables

Table 1. Project Team and their Roles ……...……...15

Table 2. Implementation Barriers and Mitigation Strategies …….....……...18

Table 3. Project Timeline …….....……..…...18

Table 4. Estimated Costs …….....……..…...19

List of Figures

Figure 1. Staff Nurse Peanut Ball Education Attendance Pie Graph ……...…….22

Figure 2. Peanut Ball Documentation Pie Graph …….....…….....23

Figure 3. Cesarean Section Rates Line Graph …….....……..…...24

Figure 4. Averages of C-Section Rates Three Months Before and After Bar Graph …….....24

Abstract

Cesarean sections, although sometimes medically necessary, carry multiple risks and complications. Movement and frequent repositioning throughout labor has been shown to support the natural physiologic process of birth, leading to less medical intervention and increased incidences of vaginal deliveries. The peanut ball is a variation of a birthing ball that assists women with this movement and repositioning. The purpose of this quality improvement project was to see if increasing nursing knowledge on peanut ball benefits, risks, and proper technique would reduce cesarean section rates. It is expected that peanut ball use throughout labor would decrease cesarean sections and increase the probability of vaginal delivery.

The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Model guided this project with a three-step process called PET, practice question, evidence, and translation. Best evidence recommendations were formulated following internal and external evidence review and quality appraisal. Before implementation, peanut balls were stocked, and 91% of the staff nurses attended an educational intervention outlining appropriate peanut ball use. Chart audits occurred from a newly added section within the labor flowsheet after three months, reflecting peanut ball use for 251 patients (16%). The hospital's cesarean section rates for the three months before and after implementation were compared, showing no statistically significant difference.

An increase in nursing knowledge and the availability of peanut balls successfully led to the integration of the peanut balls into daily practice in a labor and delivery unit. Peanut balls are labor tools that nurses can use to help patients maintain adequate pelvic positioning to promote vaginal delivery despite the immobility brought on by epidural anesthesia.

Keywords: labor and delivery, peanut ball(s), birthing ball(s), cesarean section, cesarean delivery

Problem Identification and Evidence Review

Despite known risks of surgery, approximately one-third of all newborns delivered in the United States in 2021 were born via cesarean section (Osterman et al., 2023). With a rate of 32.1%, 2021 marked the second year that the U.S. has increased its c-section rate. Although there are many situations where a C-section is the safest option for a mother or baby, the steady rise in C-sections could indicate that this mode of delivery is overused. Cesarean sections, like any other major abdominal surgery, carry the following risks and complications: increased blood loss, risk of infection, possible injury to surrounding organs, extended hospital stay, and longer recovery time (American Pregnancy Association, n.d.). Regarding obstetrical risks, having a cesarean delivery impacts future pregnancies due to the increased risk of miscarriage, stillbirth, and placenta abnormalities, such as previa, accreta, and abruption (Keag et al., 2018). Boyle et al. (2013) report that the most common indications for a primary cesarean section are failure to progress, nonreassuring fetal heart rate tracing, and fetal malpresentation. Movement and frequent repositioning throughout labor has been shown to support the natural physiologic process of birth, leading to less medical intervention (Ondeck, 2014).

There are many different options for pain management during labor, with an epidural being the current most common (American Society of Anesthesiologists, n.d.). Epidurals numb the lower half of a woman's body which helps ease contraction pain; however, it also results in limited mobility and confinement to the bed. Often, a woman's position in the labor room is heavily influenced by the muscle weaknesses associated with epidurals, monitoring requirements imposed by hospitals, and the ease of providing obstetric interventions in horizontal positions (Desseauve et al., 2017). Research suggests, however, that upright positioning and increased maternal mobility have several benefits for labor, including the widening of the pelvic inlet

(Reitter et al., 2014). This effect on the pelvic inlet is thought to decrease the length of labor and increase the chances of a vaginal delivery. Currently, labor and delivery nurses are tasked with regular repositioning of their labor patients to promote labor progression, patient satisfaction, and neonatal well-being.

The peanut ball is a variation of the exercise balls used in physical therapy whose origins can be traced back to Italy in the 1960s (Eveleigh, n.d.). A round birthing ball was the first variation used on labor and delivery units in the 1980s (Grant, 2022). Birthing balls assist women in maximizing an upright posture, alleviating their pain, and positioning or encouraging the baby to move down the birth canal (The Birth Ball, n.d.). The peanut ball is a more recent variation of a birthing ball with an oblong shape that is larger on each side and narrower in the middle (Premier Birth Tools, n.d.). This unique shape makes it easier for a woman to use while in bed, making it an ideal option for women laboring with epidurals. Peanut balls are a labor tool that can be used nationally to help patients maintain adequate pelvic positioning despite the immobility brought on by epidural anesthesia. This project aimed to implement peanut balls in a labor and delivery unit as part of a quality improvement initiative to promote vaginal deliveries.

Description of Local Problem

The site for this project has one of the busiest maternity floors in NYC, reporting 7,816 births in 2017. In 2021, this hospital had a primary c-section rate of 30.1%. While this rate aligns with the current national rate, it is still too high. According to Healthy People 2030, the country is working towards a c-section goal rate of 23.6% (Office of Disease Prevention and Health Promotion, n.d.). Although higher than this nationally proposed goal, the hospital site for this project successfully lowered its rate to 26.4% in 2022. This progress was short-lasting, as a recent data report shows that for the last year of 2023, the hospital has a rate of 29.0%.

In addition to patient risks, healthcare costs associated with c-sections are another national concern. Negrini et al. (2021) assert that healthcare expenditure is growing more rapidly than the global economy and that the maternal-perinatal care sphere represents a large portion of these expenditures. In low-risk pregnancies, cesarean deliveries are almost 15% more expensive than vaginal deliveries, with the higher costs related to extended maternal stays and increased NICU admissions. Reducing c-section rates can help decrease hospital spending and improve patient outcomes and satisfaction.

Clinical Questions

The first step in implementing this project required developing clinical questions to guide the focused evidence search on this topic. The following two PICO questions were used:

- In laboring patients (P), how does the utilization of peanut balls (I) compared to no use (C) affect rates of cesarean sections?
- In laboring patients (P), how does the utilization of peanut balls (I) compared to no use (C) affect the duration of labor stages?

Methods for Gathering External and Internal Evidence

The following databases were utilized in the evidence search; CINAHL Ultimate, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, MEDLINE with Full Text, Nursing & Allied Health Premium, and PubMed. The keywords searched were peanut ball(s), cesarean section, including all related spellings/abbreviations, and labor duration or stages. Searches were limited to peer-reviewed articles in English, published between 2013 and 2023 (see Appendix A). Keeper articles were identified using Rapid Critical Appraisal (RCA) Tools (Melnyk & Fineout-Overholt, 2019). Internal evidence will be gathered through hospital-specific data reports, informal discussions, and emails sent to all staff.

Search Results

Internal Evidence. This project's site does not supply peanut balls to the L&D unit. Currently, peanut ball utilization is only possible when patients supply their own. Staff nurses appear eager to become expert users, identified by the immense response to a feeler email sent to staff searching for volunteer peanut ball ambassadors and trainers. A total of 21 staff members expressed interest in pursuing the voluntary training, with 13 signing up to be ambassadors and eight signing up to be trainers. In addition, a sister hospital within the same healthcare system as this project's site hospital created and implemented a peanut ball policy at the beginning of 2023. Before this change, the sister hospital already stocked peanut balls on their L&D unit; however, their unit leaders are currently undergoing a similar quality improvement project evaluating the effect of an improved educational intervention on nurse competency and utilization of peanut balls.

In addition, the unit's safety officer conducted a hospital data report in August of 2023 to determine the current primary cesarean rate. For delivery dates occurring January 1, 2023, to August 1, 2023, the hospital had a nulliparous, term, singleton, vertex (NTSV) cesarean birth rate of 29.0%. The NTSV c-section rate is used as the quality indicator rather than the overall c-section rate because it represents patients who are considered low-risk (Office of Disease Prevention and Health Promotion, n.d.). This value controls for variables that may lead to increased cesarean delivery rates, such as having a previous c-section, a fetal breech position, and multiple births. As previously stated, the U.S. had a national rate of 32.1% in 2021, so although this project's site seems to be doing better comparatively on a national scale, we still need to meet the 23.6% Healthy People Goal (Osterman et al., 2023). Institutional barriers to meeting this goal include staffing shortages, inadequate staff competency in prevention

strategies, and low patient health literacy levels. The peanut ball is an evidence-based tool that can be considered institutionally to combat these barriers and promote vaginal deliveries safely and effectively (Grant, 2022).

External Evidence. Six articles were chosen as keeper articles for this project's evidence. As mentioned, each article was appraised using the Rapid Critical Appraisal Tools (Melnyk & Fineout-Overholt, 2019). Appendix B displays the completed RCA tool for one of the chosen articles (see Appendix B). Levels of evidence ranged from level I to IV (see Appendix C). An evidence summary table can be found in Appendix D for further details regarding each chosen article (see Appendix D).

Evidence Appraisal Summary, Synthesis, and Recommendations

The evidence search highly supports the use of peanut balls to reduce cesarean sections, with an additional small amount of evidence to support its use in reducing labor stage durations (see Appendix E). Delgado et al. (2022) conducted a systematic review and meta-analysis to evaluate the effect of using a peanut ball during labor in women with an epidural. They found that using the peanut ball was associated with an 11% increase in the chances of vaginal delivery and a reduction in the first stage of labor by 87.42 minutes. Three other studies supported the reduction in cesarean births following peanut ball use, two of which were randomized control trials, making them high-level evidence (Evans & Cremering, 2016; Hickey & Savage, 2019; Tussey et al., 2015). Roth et al. (2016) found that for primiparous women, peanut ball use during labor was associated with a reduction in the duration of the first stage of labor. This correlation is further supported by Tussey et al. (2015) who reported a reduction of 29 minutes in the first stage of labor following peanut ball use. None of the studies showed any association between

peanut ball use and adverse maternal or neonatal outcomes. These findings support the utilization of the peanut ball as a birthing tool for women laboring with or without an epidural.

Based on the evidence, the recommendation was to supply peanut balls to the L&D unit and train all the nurses on their appropriate use. All four sizes of peanut balls should be stocked to allow for appropriate utilization with women of all heights (Grant, 2022). The staff nurses should be educated on the seven original peanut ball positions, including side-lying, tuck position, semi-sitting lunge, fire-hydrant, forward-leaning, straddling, and pushing (Grant & Clutter, 2014) (see Appendix F). Complete knowledge of the cervical exam can assist in choosing individualized patient positioning. Therefore, nurses will be encouraged to communicate with obstetric providers during each vaginal exam to obtain knowledge of the cervical dilation, effacement, and fetal station.

Project Plan

Project Goals

1. To improve adoption of peanut balls on a labor and delivery unit evidenced by RNs charting its use.
2. To train 85% of nurses regarding peanut ball labor benefits and proper technique.
3. To decrease primary cesarean section rates, calculated by analyzing the monthly C/S rate for the three months before and the three months after implementation.

Framework

The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Model was used as the framework for this project. The most recent revision of this model highlights the importance of interprofessional teams, which is a critical component of practice in an L&D unit (Dang et al., 2022). This model uses a three-step process called PET, practice question, evidence, and

translation to ensure that recent evidence and healthcare practices are effectively translated into patient care. User-friendly tools included in this model helped guide each project planning phase.

Practice Question. Seven operational steps guided the first part of this process. The first step was to create a project team and determine its functioning. An interprofessional team is vital, as members from different disciplines can provide varied knowledge, skills, and methods. In addition, team leadership was defined in this phase, and team meetings were scheduled. The second focus of this phase involved defining a practice problem and developing an evidence-based question to guide the project. Lastly, stakeholders were identified.

Evidence. The second phase of the PET process included five key steps to guide the evidence search. The above sections of this paper show the outcomes of this step, including conducting external and internal evidence searches, appraising the level and quality of the evidence, and synthesizing the findings. At the end of this phase, the best evidence recommendations were formulated.

Translation. The final phase of the process was crucial in cultivating a successful change to practice, processes, or systems. In this phase, the team assessed the recommendations formulated in phase two and transferred them to a specific practice site. This significant phase then included steps to guide change implementation, evaluation, and communication.

Context

The hospital site for this project is one of New York City's major hospitals and a part of a more extensive healthcare network. The L&D unit contains 18 laboring rooms, four triage areas, four high-risk antepartum rooms, and three operating rooms. Clinical personnel on the L&D unit include attending obstetricians, resident MDs, anesthesiologists, registered nurses, certified nurse midwives, and physician assistants. EPIC is the hospital's electronic medical record system.

Project Team and Roles

Table 1. displays the project team members and their roles.

Table 1. Project Team and their Roles

Person	Role
Alexi Rivera RN, DNP student	Project Manager
Jennette Morgan CNM, Primary Project Mentor	Project review for compliance with health system standards
Nicole Clampet RN, Nursing Educator	Assist with education of ambassadors and nursing staff regarding practice change
Geraldine Budd, DNP faculty advisor	EBP and QI expert
Hospital's Associate Director of Obstetric Inpatient Operations	Operation manager, coordinate with third-party vendor to coordinate payment and receipt of products
Unit's Clinical Informaticist	Integrate new charting component into EPIC flowsheet

Key Stakeholders and Buy-in

Key stakeholders identified for this project included L&D staff nurses, obstetricians, midwives, physician assistants, nursing managers, the medical director, nursing educators, patients, and patient support persons. Successful implementation of this project required buy-in from bedside clinical staff, such as staff nurses and obstetric providers. In addition, close collaboration with the nursing education department was required to develop an educational intervention to increase staff knowledge. Nursing engagement was reinforced with open discussions regarding project goals, missions, and plans. As previously mentioned, numerous staff nurses were identified as possible peanut ball ambassadors through their email response asking for volunteers.

Description of the Practice Change

The labor and delivery unit began the process of adopting an official policy. This policy was already in place at a sister hospital within the Health System and, therefore, was also to be

implemented at this project's site. The policy outlines specific instructions on peanut ball utilization, including the following points (Grant, 2022):

- Peanut balls were purchased by the hospital and should be readily available and offered to all laboring patients in the Labor and Delivery unit.
    - Women using epidural anesthesia should be especially considered for peanut ball use as this tool can help counteract the effects of the resulting limited mobility.
- All four sizes of peanut balls should be stocked.
    - 40cm ball – Recommended for women who are under 5' 3, petite or short legs.
    - 50cm ball *most common – Recommended for women who are 5'3″ to 5'6″
    - 60cm ball - Recommended for 5'7″ or taller women with long legs.
    - 70cm ball - ONLY size to sit on and straddle.
- Peanut balls should be properly stored and cleaned when not in use. The unit's Obstetric Technicians, responsible for stocking of the labor rooms, will be tasked with this responsibility as part of their daily tasks.
    - Sani Wipes should be used to wipe balls after every use. Bleach-containing wipes should be used only when the ball is visibly soiled.
    - The balls should be stored off the ground.
    - When in use, the ball should be enveloped in some sort of cover, examples include a patient gown, blanket, and/or sheet.
    - Balls should be replaced every 1-2 years.
- Nurses should be educated on the seven original peanut ball positions.
    - Patients should have their position changed every 30-60 minutes.

    - Collaboration with providers should occur. Knowledge of the full cervical exam, including dilation, effacement, and station, will better assist with the choice of position.
- Nurses should be educated on the contraindications for peanut ball use. Ex:
    - Current or history of broken hip, pelvis, or symphysis
    - Suspicion of, or current, DVT

The practice change continued with selecting peanut ball ambassadors and trainers from both day and night shifts on the L&D unit. These selected individuals received online training and resources via Premier Birth Tools to become certified. In collaboration with the peanut ball trainers and the L&D nurse educator, the project lead implemented an educational intervention to provide tutorials to all staff nurses in alignment with the above-mentioned policy. The ambassadors were identified as additional resources for point-of-care assistance. Lastly, the team worked with the EPIC IT personnel assigned to the obstetric department to incorporate a documentation section regarding peanut ball use. The labor flowsheet also enabled nurses to document different positions utilized and the frequency of position changes.

Evaluation Plan

Evaluation of peanut ball implementation primarily occurred through chart audits of de-identified data. The newly added section within the labor flowsheet detailed how patients utilized the peanut ball throughout their labor. Nursing education was evaluated through monitoring and tracking attendance to the nursing educational service, with a benchmark of reaching 85% of staff nurses. Cesarean section rates were evaluated for the three months immediately before peanut ball implementation and the three months after implementation. Nurse satisfaction was unofficially evaluated through observation and casual discussions by the project manager.

Barriers to Implementation and Sustainability with Mitigation Plan

Table 2 displays possible barriers to project implementation and strategies that were used to mitigate these barriers.

Table 2. Implementation Barriers and Mitigation Strategies

Barrier	Strategy for Mitigating
Inadequate supply of peanut balls	Work with the supply team to include regular rounding on peanut ball supplies in their routine check
Nurse or provider biases regarding peanut ball use	Provide educational interventions to staff nurses regarding the evidence support of peanut ball use. Promote discussions with obstetric providers on same topic.
Patient reluctance to use peanut balls	Discuss with obstetric providers the evidence behind peanut ball use so they can educate patients during their prenatal course
Non-reassuring fetal heart rates limiting maternal repositioning	Identify different positions that can be utilized without switching the patient's side completely, such as elevating or lowering hips and/or angling knees in or out

The publication of an approved policy/protocol on the hospital's intranet significantly aids in the sustainability of the practice change. The Peanut Ball Ambassador program was another tool that supported change sustainability, as this free online certification can be done by anyone interested in developing their skills further. The initially identified ambassadors were the "super users" on the floor. However, this educational opportunity was accessible to all interested.

Timeline

Table 3 displays the project timeline.

Table 3. Project Timeline

Date	Action
July 2023	Discuss with the hospital's Nursing Research Department to determine QI process
July 2023 – August 2023	Prepare written and oral QI proposal for presentation
September 2023	DNP project proposal oral and paper presentation.
October 2023	Submit to Nursing Research Department and SHU IRB

October -December 2023	Complete peanut ball trainer certification. Submit policy to hospital's policy committee. Work with nursing education department to create educational plan.
December 2023	Work with IT department to implement epic charting addition.
January – February 2024	Educate all nursing staff
February 2024	Secure stocking of peanut balls on L&D. Implementation of proposed practice change
February – May 2024	Perform chart audits and data reports
June – July 2024	Compile data from three-month intervention period for data display and interpretation
July 2024	DNP project final oral and paper presentation

Resources/Budget

The following table displays the estimated associated costs with project implementation, including materials to promote project awareness and salaries for most integral team members. Other miscellaneous costs included a $83.99 charge for the voluntary peanut ball ambassador training and a $150.00 charge for the voluntary peanut ball training, which was reimbursed through the hospital.

Table 4. Estimated Costs

Materials	
Poster Supplies	~ $10
Laminated Peanut Ball Pages	~ $20
Personnel	
Project Manager – DNP Student	5% of annual salary approx. $100,000 = $5,000
Project Lead - CNM	5% of annual salary approx. $140,000 = $7,000
Nurse Educator	5% of annual salary approx. $140,000 = $7,000

Dissemination Plan

The dissemination plan for this project included an abstract and project paper summary for the Sacred Heart University College of Nursing. In addition, an oral and poster presentation was created for the SHU faculty and students. Regarding internal dissemination within the practice site, an executive summary and PDF version of the poster was submitted to hospital leadership. These documents were then dispersed to the L&D staff via broadcast emails and biweekly "stork reports." External dissemination will be accomplished through possible abstract submissions to nationally recognized journals, such as the Journal of Obstetric, Gynecologic, and Neonatal Nursing.

Ethical Review

The proposal was submitted to the hospital's nursing project approval council and received approval (see Appendix G). This project did not require the hospital's Institutional Review Board approval because it was a quality improvement project (see Appendix H). This project was also submitted to the Sacred Heart University IRB and received an exempt status (see Appendix I). Project implementation was supported and approved by the hospital's Medical Director of Obstetrics, the Senior Director of Women's Services, and the L&D Clinical Nurse Manager.

Project Implementation

Peanut Ball Preparation

After obtaining support for peanut ball implementation from hospital leadership, the Associate Director of Obstetric Inpatient Operations was assigned as the project's operation manager to oversee the securement and overall implementation of peanut balls. He was responsible for contacting the third-party vendor Premier Birth Tools to coordinate payment and receipt of products. The hospital received the peanut balls and the accompanying educational

materials for the ambassadors and trainers in late September. The total order consisted of thirteen ambassador programs, eight trainer programs, and sixteen peanut balls of varying sizes. Communication was sent out to staff by the L&D manager to pick up their educational packets in late October. This DNP student received her peanut ball trainer educational materials on October 28th, 2023.

The peanut ball trainer certification was an extensive and rigorous process, demanding each participant to delve into and summarize 40 articles, 17 videos, four handouts, two podcasts, a PowerPoint, and a book. Upon completion of these prerequisites, the individual was required to pass an online module and quiz, develop a peanut ball class outline, create a peanut ball instructional video, and conclude with a conference call with the owner and instructor of Premier Birth Tools. Four staff members, including this DNP student and this project's practice mentor, successfully completed this training. This DNP student obtained official peanut ball certification on December 7th, 2023.

During the trainer certification process, all parties involved engaged in collaborative discussions about stocking peanut balls in the units. The Clinical Informaticist assigned to L&D was consulted about incorporating a section into the EPIC labor flowsheet to document peanut ball use (see Appendix J). She seamlessly integrated a section in the labor flowsheet, enabling nurses to record when peanut balls were used and what position was utilized. The operations manager submitted the proposed policy, adapted from this organization’s sister hospital to the infection prevention department. However, the approval of an official policy was delayed due to requests by infection prevention for further discussion and clarification. A meeting was held, attended by Infection Prevention and L&D leadership, to review and agree upon the proposed

recommendations and changes. The updated policy is being edited and uploaded to the hospital's official policy tech.

Staff Nurse Education

Before stocking the peanut balls onto the unit, hospital management required peanut ball competency for most staff nurses, attained through attending this project's educational intervention. As mentioned, four staff members became certified to teach proper peanut ball use. This DNP student and the unit's educator were the primary personnel conducting the educational in-service, which included a PowerPoint of pertinent information such as contraindications to peanut ball use, multiple different positions, proper storage, in-use procedures, and required documentation. The class was structured to include a theoretical session where the trainers explained the concepts and a practical session where the nurses had hands-on experience with the peanut balls. Peanut ball education began once this DNP student secured the four peanut balls needed for the class on January 9th, 2024. Attendance to the peanut ball in-service was a requirement of all staff nurses on both day and night shifts. A proficiency checklist was created to ensure all staff received the same education regardless of which trainer conducted the session (see Appendix K).

Official Implementation

The peanut balls were officially stocked onto the unit on February 26th, 2024. Although original plans involved implementing all 16 purchased balls, only seven balls were stocked onto the unit due to limited options for storage. The seven peanut balls available for patient use included two 40cm balls, four 50cm balls, and one 60cm ball, with none of the large 70cm balls stocked onto the unit. The decision on which sizes to stock was based on the knowledge that the 50cm ball is the most used ball for the average-sized woman, and most patients have an epidural,

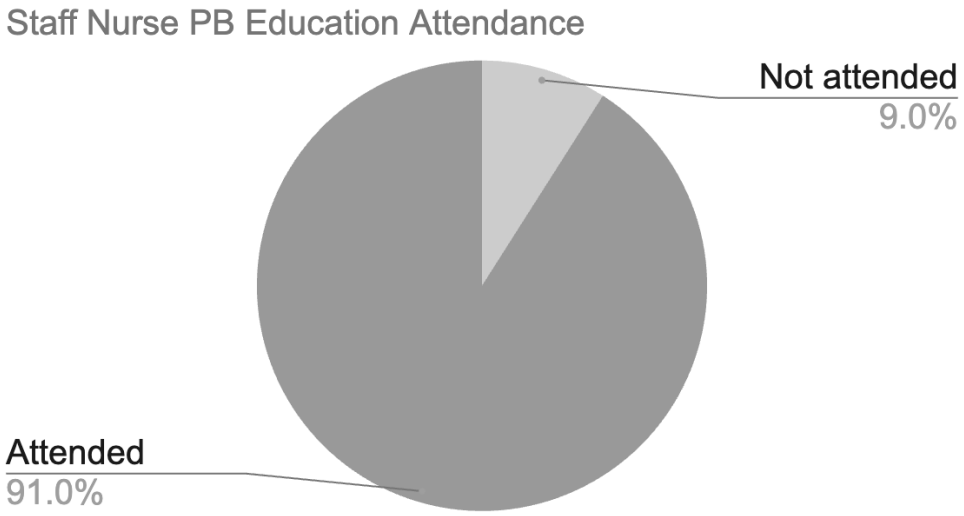
making the 70cm ball useless. Ongoing communication and encouragement for nurses regarding peanut ball use were conducted during shift huddles held twice a day at the change of shift, including both day and night shifts.

Project Evaluation

Results

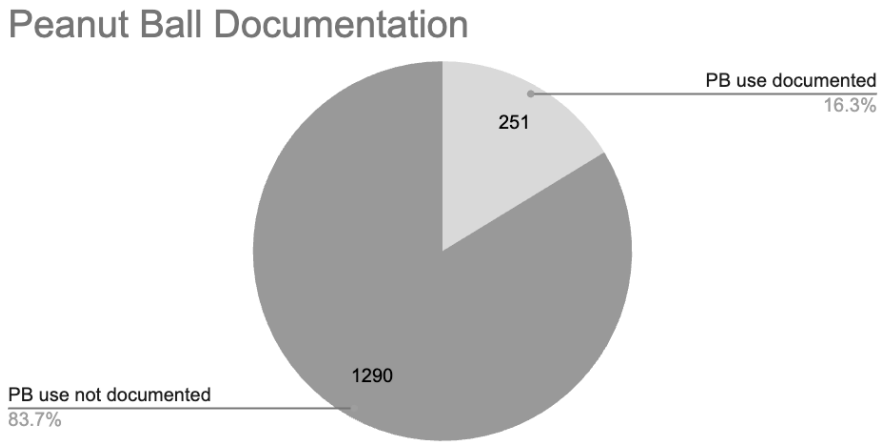
Before official peanut ball implementation, this DNP student and the unit's educator conducted educational in-services regarding peanut ball use. One hundred thirty-two nurses attended the peanut ball educational intervention before implementation, making up 91% of the staff nurses. Figure 1 depicts this percentage. The overall attendance included 72-day and 59-night shift nurses (see Appendix L). All nurses who attended the class completed a competency checklist and submitted it to the unit's educator to be added to their hospital education file. This DNP student and the peanut ball ambassadors provided ongoing support and point-of-care assistance throughout the intervention.

Figure 1



The adoption of the peanut ball was evaluated by analyzing the documentation from the newly added section in the labor flowsheet. The hospital's IT department generated a data report showing de-identified data regarding peanut ball use within the intervention time period. Over the three months of implementation, 251 patient charts reflected documentation of PB use. Figure 2 displays this number of patients in relation to the total number of patients delivered within this period. This accounted for 16.3% of all delivered patients.

Figure 2



The unit's cesarean section rate was evaluated through monthly generated data reports. The data was analyzed three months before and after peanut ball implementation. Figure 3 shows the trend for the total and primary cesarean section rates from December 2023 to June 2024. Both values were analyzed, with the primary c-section rate being the more sensitive quality indicator as it controls for variables that may lead to higher c-section rates, such as having a prior c-section. There was no significant change in either of these values throughout the project's timeline. Figure 4 displays the averages for total and primary cesarean section rates for the three months before and after the intervention. The three months before intervention had an average total c-section rate of 29.5% and a primary c-section rate of 18.8%. The three months after

intervention implementation had similar but slightly higher averages of 29.6% total c-sections and 19.17% primary c-sections.

Figure 3

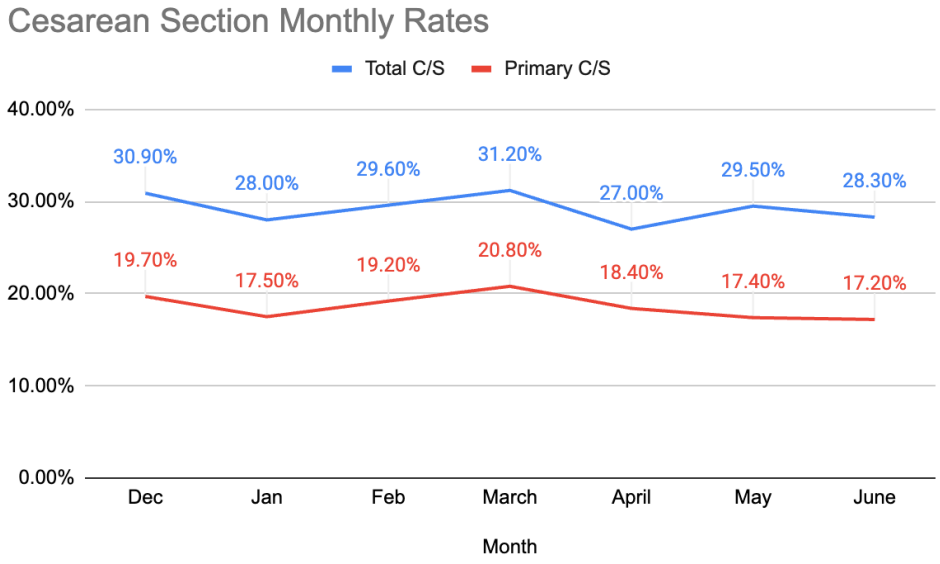
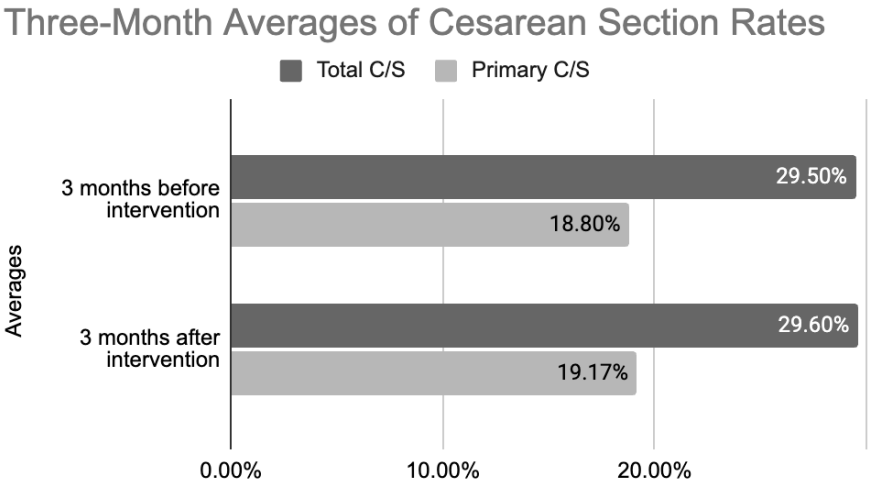


Figure 4



Goals and Achievement

One of this project's goals was to train 85% of nurses regarding peanut ball labor benefits and proper technique. This goal was achieved with 91% of staff nurses being educated prior to

peanut ball implementation. Moving forward, peanut ball education will be programmed into the new hire's didactic schedule.

The second goal of this project was to improve the adoption and availability of the peanut ball on a labor and delivery unit. This goal was met successfully, evidenced by 251 patient charts reflecting peanut use throughout labor. Although this only accounts for 16% of the deliveries within the intervention period, it represents many patients and nurses who utilized the peanut ball. In addition, this number does not account for the patients who may have used the peanut ball, but the nurse may have failed to document it accurately. In addition, informal discussions with nurses and providers showed increased satisfaction with the peanut ball and multiple accounts of "success stories."

The last goal for this project involved decreasing the unit's c-section rates. There was no statistically significant change in the total or primary c-section rate for the three months following peanut ball implementation. However, it is essential to note that the data collected and analyzed for this project included c-section rates for the entire unit. This data point accounted for all scheduled cases, regardless of the reason, meaning these were patients that never tried for a vaginal delivery, and there was no opportunity for peanut ball use. This overall inclusive rate could have been a confounding factor affecting this project's statistical significance.

Another interesting point is that in March, the first month following implementation, there was a spike or increase in the c-section rates, the cause of which is unknown. When looking at the months following this, there is a decrease in the c-section rates. The average primary c-section rate for the overall period following intervention, excluding this March value, is 17.7%, which would account for an exciting decrease from a primary c-section average of 18.8% prior to intervention. Although this does not add to the statistical significance of this

project, it may hint at some effect of the peanut balls, so it will be interesting to see the trend moving forward as more nurses and patients keep using them. In addition, it is beneficial to analyze the c-section rates specifically for the patients who utilized the peanut ball and compare them to those who did not use them. This more specific data could lead to more valid and reliable results regarding the effect of peanut balls on c-section rates. However, consistent documentation of peanut ball use would be required.

Return On Investment

Implementing peanut balls in the labor and delivery unit is a positive practice change that, in time, may have a significant return on investment. Although not shown in the three-month intervention period for this project, evidence shows that peanut ball use throughout labor has been associated with an increase in the incidences of vaginal deliveries and a decrease in c-section rates (Delgado et al., 2022; Evans & Cremering, 2016; Hickey & Savage, 2019; Tussey et al., 2015). Educating the staff nurses and supplying peanut balls on the unit are low-cost solutions that offer the possibility of lowering the hospital's c-section rate to meet the goal set forth by Healthy People 2030. In addition, this project alluded to increased patient satisfaction, which would also add to its overall value.

Key Lessons Learned

One key lesson learned throughout this process is that quality improvement projects require approval from multiple departments in a large, urban hospital within an even more significant health system. Obtaining support and approval from the unit's direct manager was simple enough; however, other leaders and departments needed to sign off on the project before getting the peanut balls on the floor. The challenges faced in this process included lapses in

communication, delays in responses, and lack of urgency from involved parties, highlighting the complexity of implementing a new intervention on a unit within an extensive health system.

Another important lesson learned from this project is that nurse buy-in will lead the practice change. From the beginning conversations about trying to get the peanut balls, it was obvious that the nurses were excited about this new, fun tool. They were eager to learn and even more eager for them to be available once they had learned. The passion of the staff nurses regarding this new labor tool was noted, and it helped drive the change in practice. A final lesson learned from this project is that peanut balls aid in shared decision-making between healthcare personnel and patients. Beyond being a labor tool to promote repositioning, the peanut ball also acts as a communication tool by encouraging interdisciplinary collaboration between patients, nurses, and providers.

Sustainability

As mentioned, an official policy regarding this practice change will eventually be posted to the hospital's intranet. This policy is currently being edited and processed to be uploaded. It will outline all topics covered within the nursing educational intervention, such as peanut ball use risks, benefits, and proper technique. This education will also be incorporated into the annual competencies reviewed with the nursing educator and all staff nurses on the unit. New hires for the unit will also receive peanut ball education. Lastly, the peanut ball ambassador and trainer programs support the sustainability of this practice change. These programs are free to employees as the cost of attendance is reimbursed by the hospital and available to all interested.

Dissemination

Dissemination of this project's results will occur both internally and externally. An oral and poster presentation was done for the SHU faculty and students. An executive summary and

poster presentation will be given to hospital leadership. In addition, the poster will be dispersed to L&D staff on the daily management board, which will be displayed and available to all staff members. Lastly, the PDF of the poster and executive summary will be included in the L&D "stork report," a monthly newsletter sent to all staff. External dissemination will occur through possible abstract submissions to nationally recognized journals, such as the Journal of Obstetric, Gynecologic, and Neonatal Nursing.

Implications of Results

This quality improvement project aimed to implement a nursing practice change by introducing peanut balls on a labor and delivery unit for use by nurses with their patients. While the project did not yield statistically significant evidence supporting a reduction in cesarean section rates, informal assessments of nurse and patient satisfaction showed promising results. The limited number of stocked peanut balls (only 7 out of 16 purchased) may have affected the data, potentially leading to instances where patients or nurses could not access a peanut ball when needed due to insufficient availability or incorrect sizing. Moving forward, increasing the stock of peanut balls on the unit is recommended to better represent their impact on healthcare outcomes. Moreover, it's important to note the significant role peanut balls played in shared decision-making and communication, which is a key aspect of patient care and should be further explored through official data collection on patient satisfaction.

References

American Society of Anesthesiologists. (n.d.). *Labor pain*. Made For This Moment. https://www.asahq.org/madeforthismoment/pain-management/types-of-pain/labor/

American Pregnancy Association. (n.d.). *C-section complications*. https://americanpregnancy.org/healthy-pregnancy/labor-and-birth/c-section-complications/

The Birth Ball. (n.d.). *Real benefits of using a birthing ball*. https://thebirthball.com/pages/benefits-of-a-birthing-ball

Boyle, A., Reddy, U. M., Landy, H. J., Huang, C. C., Driggers, R. W., & Laughon, S. K. (2013). Primary cesarean delivery in the United States. *Obstetrics and gynecology*, *122*(1), 33–40. https://doi-org.sacredheart.idm.oclc.org/10.1097/AOG.0b013e3182952242

Dang, D., Dearholt, S., Bissett, K., Ascenzi, J., & Whalen, M. (2022). *Johns Hopkins evidence-based practice for nurses and healthcare professionals: Model and guidelines*. 4th ed. Sigma Theta Tau International

Delgado, A., Katz, L., Melo, R. S., Amorim, M., & Lemos, A. (2022). Effectiveness of the peanut ball use for women with epidural analgesia in labour: a systematic review and meta-analysis. Journal of Obstetrics & Gynaecology, 42(5), 726–733. https://doi-org.sacredheart.idm.oclc.org/10.1080/01443615.2021.1997959

Desseauve, D., Fradet, L., Lacouture, P., & Pierre, F. (2017). Position for labor and birth: State of knowledge and biomechanical perspectives. *European Journal of Obstetrics and Gynecology*, *208*, 46–54. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.ejogrb.2016.11.006

Evans, S. J., & Cremering, M. M. (2016). Use of Peanut Labor Ball for Pelvic Positioning for Nulliparous Women Following Epidural Anesthesia. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *45*(3), S47. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.jogn.2016.03.119

Eveleigh, J. (n.d.). *Exercise ball history*. Exercise Ball Exercises. https://www.exercise-ball-exercises.com/exercise-ball-history.html

Grant, C. (2022). *The peanut ball: Basic and advanced techniques for use during labor and delivery*. Premier Birth Tools LLC.

Grant, C. B. & Clutter, L. B. (2014) The Peanut Ball: A Remarkable Labor Support Tool. International Doula, 22(4), 12-15.

Hickey, L., & Savage, J. (2019). Effect of Peanut Ball and Position Changes in Women Laboring With an Epidural. *Nursing for Women's Health*, *23*(3), 245–252. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.nwh.2019.04.004

Keag, O. E., Norman, J. E., & Stock, S. J. (2018). Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. *PLoS Medicine*, *15*(1), 1–22. https://doi-org.sacredheart.idm.oclc.org/10.1371/journal.pmed.1002494

Melnyk, B. M., & Fineout-Overholt, E. F. (2019). *Evidence-based practice in nursing and healthcare: A guide to practice* (4th ed.). Wolters Kluwer.

Negrini, R., da Silva Ferreira, R. D., & Guimarães, D. Z. (2021). Value-based care in obstetrics: comparison between vaginal birth and caesarean section. *BMC pregnancy and childbirth*, *21*(1), 333. https://doi-org.sacredheart.idm.oclc.org/10.1186/s12884-021-03798-2

Office of Disease Prevention and Health Promotion. (n.d.). Reduce cesarean births among low-risk women with no prior births - MICH-06. *Healthy People 2030*. U.S. Department of Health and Human Services. https://health.gov/healthypeople/objectives-and-data/social-determinants-health

Ondeck M. (2014). Healthy birth practice #2: walk, move around, and change positions throughout labor. *The Journal of perinatal education*, *23*(4), 188–193. https://doi-org.sacredheart.idm.oclc.org/10.1891/1058-1243.23.4.188

Osterman, M, J.K., Hamilton, B. E., Martin, J. A., Driscoll, A. K., & Valenzuela, C. P. (2023). *Births: Final Data for 2021*. National Vital Statistics Report; vol 72 no 1. https://www.cdc.gov/nchs/data/nvsr/nvsr72/nvsr72-01.pdf

Premier Birth Tools. (n.d.). *Give birth with balls*. https://premierbirthtools.com/peanut-ball/

Reitter, A., Daviss, B.-A., Bisits, A., Schollenberger, A., Vogl, T., Herrmann, E., Louwen, F., & Zangos, S. (2014). Does pregnancy and/or shifting positions create more room in a woman's pelvis? *American Journal of Obstetrics and Gynecology*, *211*(6), 662. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.ajog.2014.06.029

Roth, C., Dent, S. A., Parfitt, S. E., Bering, S. L., & Bay, R. C. (2016). Randomized Controlled Trial of Use of the Peanut Ball During Labor. *MCN: The American Journal of Maternal Child Nursing*, *41*(3), 140–146. https://doi-org.sacredheart.idm.oclc.org/10.1097/NMC.0000000000000232

Tussey, C. M., Botsios, E., Gerkin, R. D., Kelly, L. A., Gamez, J., & Mensik, J. (2015). Reducing Length of Labor and Cesarean Surgery Rate Using a Peanut Ball for Women Laboring With an

Epidural. *Journal of Perinatal Education*, *24*(1), 16–24. https://doi-org.sacredheart.idm.oclc.org/10.1891/1058-1243.24.1.16

Appendix A

Record of Search and Yield

Record of Search History and Yield

INSTRUCTIONS: When searching in bibliographic databases, save the search history, and record the terms used, how they were combined, and the yield.

	Date of Search	Database (Source and Link)	Search or MeSH Terms	Operators (AND, OR, NOT)	Limits Used	Yield (Number of Articles Identified)
	6/4/2023	CINAHL Ultimate, Academic Search Premier, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, MEDLINE with Full Text	Peanut ball	None	English; 2013-2023; Peer-Reviewed	51
	6/4/2023	CINAHL	Peanut ball	None	English; 2013-2023	17
	6/4/2023	CINAHL	"Peanut ball or peanut balls" "c-section or cesarean section or caesarean section or cesarean delivery or caesarean or cesarean"	AND	2013-2023	9
	6/14/2023	CINAHL	"peanut ball or peanut balls" "duration or stages"	AND	2013-2023	6
	6/14/2023	Nursing & Allied Health Premium	"peanut ball"	None	English; 2013-2023; Peer-Reviewed	10
	6/14/2023	PubMed	"peanut ball"	None	2013-2023	21

MeSH = medical subject headings

Appendix B

Rapid Critical Appraisal of a Systematic Review or Meta Analysis

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

Project Title: Effectiveness of the peanut ball use for women with epidural analgesia in labour: a systematic review and meta-analysis

Date: 2022

PICOT Question: In laboring women with an epidural (P), how does the use of the peanut ball (I) compared to no peanut ball (C) affect maternal and neonatal outcomes (O)? [Maternal outcomes = length of labor stages, pain, perineal trauma, and episiotomy; Neonatal outcomes = apgars, nicu admission, and delivery room resuscitation]

Article citation (APA): Delgado, A., Katz, L., Melo, R. S., Amorim, M., & Lemos, A. (2022). Effectiveness of the peanut ball use for women with epidural analgesia in labour: a systematic review and meta-analysis. Journal of Obstetrics & Gynaecology, 42(5), 726–733. https://doi-org.sacredheart.idm.oclc.org/10.1080/01443615.2021.1997959

Indicate the level of the study you are appraising: Level 1

Recommendation for article inclusion in the body of evidence to answer your question: YES

Overview

1. Purpose of study, including research question(s) or hypotheses: "The objective of this review was to assess, using the best level of evidence, the possible benefits and disadvantages of using PB in women with an epidural during labour on maternal and neonatal outcomes."
2. Design/Method: Systematic Review and Meta-Analysis of RCTs
3. Sample: 818 women in labor using pharmacological anesthesia with a vertex fetus

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

4. Setting: Labor and delivery units in North American hospitals

Quality of the Study

Validity: Are the results of this study valid?

1. Did the systematic review/meta-analysis address a focused clinical question?

☒Yes ☐No ☐ Unknown

   a. What was the focused clinical question?What are the benefits and disadvantages of using a peanut ball in women with an epidural during labour?

2. Was the search for relevant studies detailed and exhaustive?

☒Yes ☐No ☐Unknown

Comment: Eight electronic databases were used; MEDLINE/PubMed, EMBASE, SCOPUS, LILACS, CINAHL, CENTRAL (Cochrane Central Register of Controlled Trials), Web of Science and PEDro. All RCTs or quasi-randomized studies were eligible. There was no restriction on publication time.

3. Did the systematic review/meta-analysis include RCTs? ☒Yes ☐No

   a. Was criteria used to select articles for inclusion? ☒Yes ☐No

   b. What were the criteria for inclusion? ☒Yes ☐No

   c. Random assignment to treatment groups? ☒Yes ☐No

   d. Analyzed in assigned groups? ☐Yes ☐No

   e. Complete follow-up of subjects? ☐Yes ☐No

   f. Blind? ☐Yes ☐No

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

g. Double-blind? ☐Yes ☐No

Comments: 4 RCTs were included in this document. The study population, intervention, and evaluated outcomes are clearly identified. However, there is no mention if studies were blind/double-blind or any follow-up of subjects. One study did not mention randomization.

4. Did the systematic review/meta-analysis include non-RCTs?

☐Yes ☒No ☐Unknown

a. Was criteria used to select articles for inclusion? ☐Yes ☐No

b. What were the criteria for inclusion? Click here to enter text.

c. Analyzed in assigned groups? ☐Yes

☐No

d. Complete follow-up of subjects? ☐Yes ☐No

e. Blind? ☐Yes ☐No

f. Double-blind? ☐Yes ☐No

5. Were the included studies appraised to be highly quality by the authors?

☒Yes ☐No ☐ Unknown

Comments: Risk of bias was assessed for each study. The quality of the evidence was evaluated using the GRADE system.

6. Were the methods consistent from study to study?

☒Yes ☐No ☐Unknown

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

a. Were the populations in the included studies comparable? ☒Yes ☐No

b. Were the outcomes, interventions, and exposures measured the same way in the groups being compared in the included studies? ☐Yes ☐No

Comments: "The participants had a similar mean age (between 18 and 35 years old), primiparous or multiparous, with a vertex presentation of a single fetus". There is no mention of how the outcomes and exposures were measured in each study.

7. Were the results consistent across the included studies?

☒Yes ☐No ☐ Unknown

Comments: Use of the peanut ball reduces the duration of the first period of labour by 87.42 minutes, based on high quality of evidence and increases by 11% the chance of vaginal delivery, based on moderate evidence. Concerning the other outcomes there was no difference between the groups, based on a moderate to low quality of evidence.

8. Was there freedom from conflict of interest? ☒Yes ☐No ☐ Unknown

- Sponsorship/funding agency
- Investigators

Comments: The authors declare no conflicts of interest.

9. Was the date range of the cited literature current? ☒Yes ☐ No ☐Unknown

a. What date ranges were included? 2015 to 2019

b. If older literature was included, why? None

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

Comments: There was no limit on publication date for eligible studies, however, the four studies included were between 2015 and 2019.

Reliability: Are these valid study results important?

10. What were the main results of the systematic review/meta-analysis?
    a. For each individual study:
        i. Statistical Significance (*p* value): Not included for each individual study
        ii. Confidence Interval and/or Standard Deviations: Not included for each individual study
        iii. How precise was the intervention/treatment? Not included for each individual study
            1. Narrow/wide? Not included for each individual study
    b. For the summary statistic?
        i. Statistical significance (*z* statistic): Unclear, Z-score for 95% CI = 1.96
        ii. Were the studies heterogeneous? ☒Yes ☐No
        iii. Confidence Interval: 95% confidence interval
        iv. Effect size: Click here to enter text.
        v. Did it favor the intervention? ☒Yes ☐No
        vi. Did it favor the control? ☐Yes ☒No

        Comments: The intervention shows reduction in time of first stage of labor and increases the chance of a vaginal delivery

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

11. Were the results clinically significant? ☒Yes ☐ No ☐Unknown

    a. Were the following reported: NNT, NNH, OR, RR? ☒Yes ☐No

    Comments: OR was included for spontaneous vaginal delivery. RR was included for c-section and oxytocin use.

12. Were potential confounders identified? ☐Yes ☒ No ☐Unknown

    a. Were the potential confounders discussed in the relationship to the results? ☐Yes ☐No

    Comments: Click here to enter text.

13. Were adverse events identified? ☐Yes ☒ No ☐Unknown

    Comments: Click here to enter text.

Applicability/Generalizability: Can I apply these valid, important study results?

14. Can the results be applied to my population of interest? ☒Yes ☐No ☐Unknown

    a. Is the treatment feasible in my care setting? ☒Yes ☐No

    b. Do the outcomes apply to my population of interest? ☒Yes ☐No

    c. Are the likely benefits worth the potential harm and costs? ☒Yes ☐No

    d. Are the subjects/participants in this study similar to my population of interest? ☒Yes ☐No

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

e. Were all clinically important outcomes considered? ☒Yes ☐No

15. Will you use the study/article in your practice to make a difference in outcomes?

☒Yes ☐No ☐Unknown

a. If yes, why would you do this & how? Implementation of the peanut ball can improve labor outcomes without increasing the risk of adverse outcomes.

b. If no, why would you not include the results to make a difference? Click here to enter text.

Strength of Study

Level of study: ☒ I ☐II ☐III ☐IV ☐V ☐VI ☐VII

Quality of Study: ☐High ☒Medium ☐Low

Strength = Level + Quality

What is the strength of this study? This study is of moderately high strength.

What is your recommendation for article inclusion in the body of evidence to answer your question?

☒Include this article in the body of evidence (place article on evaluation and synthesis table)

☐Do NOT include this article in the body of evidence

Rapid Critical Appraisal of a Systematic Review/Meta Analysis of Quantitative Studies

Additional comments: I will include this article in my body of evidence. The authors shows a positive relationship between peanut ball use and vaginal delivery, as well as decreased first labor stage. The studies reviewed were RCTs which are the highest levels of evidence, despite one study not mentioning randomization.

Appendix C

Levels of Evidence Synthesis Table

Peanut Ball Evidence Review Tables
Alexi Rivera

Article Legend:
1 = Delgado, A., Katz, L., Melo, R. S., Amorim, M., & Lemos, A. (2022). Effectiveness of the peanut ball use for women with epidural analgesia in labour: a systematic review and meta-analysis. Journal of Obstetrics & Gynaecology, 42(5), 726–733. https://doi-org.sacredheart.idm.oclc.org/10.1080/01443615.2021.1997959
2 = Hickey, L., & Savage, J. (2019). Effect of Peanut Ball and Position Changes in Women Laboring With an Epidural. *Nursing for Women's Health*, *23*(3), 245–252. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.nwh.2019.04.004
3 = Evans, S. J., & Cremering, M. M. (2016). Use of Peanut Labor Ball for Pelvic Positioning for Nulliparous Women Following Epidural Anesthesia. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *45*(3), S47. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.jogn.2016.03.119
4 = Roth, C., Dent, S. A., Parfitt, S. E., Bering, S. L., & Bay, R. C. (2016). Randomized Controlled Trial of Use of the Peanut Ball During Labor. *MCN: The American Journal of Maternal Child Nursing*, *41*(3), 140–146. https://doi-org.sacredheart.idm.oclc.org/10.1097/NMC.0000000000000232
5 = Tussey, C. M., Botsios, E., Gerkin, R. D., Kelly, L. A., Gamez, J., & Mensik, J. (2015). Reducing Length of Labor and Cesarean Surgery Rate Using a Peanut Ball for Women Laboring With an Epidural. *Journal of Perinatal Education*, *24*(1), 16–24. https://doi-org.sacredheart.idm.oclc.org/10.1891/1058-1243.24.1.16
6 = Alvarado, Y. & Outland, L. (2019). Preventing cesareans with peanut ball use. *Journal of Nursing Education and Practice*, *10*, 107.

Levels Of Evidence Synthesis Table

	1	2	3	4	5	6
Level I: Systematic review or meta-analysis	**X**					
Level II: Randomized controlled trial			**X**	**X**	**X**	
Level III: Controlled trial without randomization		**X**				
Level IV: Case-control or cohort study						**X**
Level V: Systematic review of qualitative or descriptive studies						
Level VI: Qualitative or descriptive study, CPG, Lit Review, QI or EBP project						
Level VII: Expert opinion						

Appendix D

Evidence Summary Table

Evidence Summary Table
Alexi Rivera

In laboring patients (P), how does utilization of peanut balls (I) compared to no use (C) affect rates of cesarean sections?

In laboring patients (P), how does utilization of peanut balls (I) compared to no use (C) affect the duration of labor stages?

	Citation	Design/ Method	Sample/Setting	Variables Studied and Definitions	Findings	Level Of Evidence	Quality Of Evidence
1	Delgado, A., Katz, L., Melo, R. S., Amorim, M., & Lemos, A. (2022). Effectiveness of the peanut ball use for women with epidural analgesia in labour: a systematic review and meta-analysis. Journal of Obstetrics & Gynaecology, 42(5), 726–733. https://doi-org.sacredheart.idm.oclc.org/10.1080/01443615.2021.1997959	Systematic Review & Meta-Analysis	L&D units in North America 818 women in labor using pharmacological anesthesia with a vertex fetus 4 RCTs included	IV = Peanut Balls DVs = - Length of first stage of labor - Length of second stage of labor - Spontaneous vaginal delivery - Cesarean delivery - Instrumental delivery - Oxytocin Use - Apgar score	Use of PB with epidural anesthesia … - reduces first stage of labor by 87.42 mins - Increases chance of vaginal delivery by 11%	Level I	Strengths: Evaluated RCTs Carefully reviewed risk of bias and quality of evidence High sample of women Limitations: One study did not state randomization Only included women with epidurals No risk of harm identified Feasible for practice
2	Hickey, L., & Savage, J. (2019). Effect of Peanut Ball and Position Changes in Women Laboring With an Epidural. *Nursing for Women's Health*, *23*(3), 245–252. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.nwh.2019.04.004	Quasiexperimental comaprison group design	Nonprofit, Magnet-designated hospital in Louisiana Total of 343 participants; 164 in PB group Exclusion criteria: didn't speak english, younger than 18, not given epidural, <37 weeks, HTN disorders, use of mag sulfate, Cat III tracing, and suspected infections	IV = Peanut Balls DVs = - Length of first stage of labor - Length of second stage of labor - Birth Type	- Lower incidence of cesarean birth for women with an epidural using the PB	Level II	Strengths: Nurse-driven intervention Includes anecdotal reports of nursing satisfaction regarding PB use Limitations: Lack of randomization Exclusion of non-english speaking participants No risk of harm identified Feasible for practice
3	Evans, S. J., & Cremering, M. M. (2016). Use of Peanut Labor Ball for Pelvic Positioning for Nulliparous Women Following Epidural Anesthesia. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *45*(3), S47. https://doi-org.sacredheart.idm.oclc.org/10.1016/j.jogn.2016.03.119	Randomized Control Trial	Large, urban hospital in the Midwest Total of 191 participants; 91 in PB group Inclusion criteria: Nulliparous women in labor or for induction at 37 to 41 weeks gestation	IV= Peanut Balls DVs= - Cesarean birth rate - Operative vaginal delivery - Third- and Fourth-degree lacerations - Length of labor	- Lower cesarean rate with peanut ball use (23.1% vs 31%) - Lower operative vaginal delivery (forceps use: 4.4% vs 7%; vacuum use: 2.2% vs 5%) - Lower third- and fourth-degree lacer-ation (2.2% vs 5%) - No difference in	Level II	Strengths: Results shown across three different hospitals Multidisciplinary approach Limitations: Does not review the sole effect of the PB No risk of harm identified Feasible for practice

					length of labor		
4	Roth, C., Dent, S. A., Parfitt, S. E., Bering, S. L., & Bay, R. C. (2016). Randomized Controlled Trial of Use of the Peanut Ball During Labor. *MCN: The American Journal of Maternal Child Nursing*, *41*(3), 140–146. https://doi-org.sacredheart.idm.oclc.org/10.1097/NMC.0000000000000232	Randomized Control Trial	Large, Magnet-designated community hospital 149 enrolled women Inclusion criteria: 18yrs old, elective labor-induction at or beyond 39 weeks, and has an epidural	IV = Peanut Balls DVs = - Length of first stage of labor - Length of second stage of labor	- Reduction in first stage of labor in primiparous women	Level II	Strengths: Randomized trial Limitations: Only included elective inductions No risk of harm identified Feasible for practice
5	Tussey, C. M., Botsios, E., Gerkin, R. D., Kelly, L. A., Gamez, J., & Mensik, J. (2015). Reducing Length of Labor and Cesarean Surgery Rate Using a Peanut Ball for Women Laboring With an Epidural. *Journal of Perinatal Education*, *24*(1), 16–24. https://doi-org.sacredheart.idm.oclc.org/10.1891/1058-1243.24.1.16	Randomized Control Trial	Large, non-profit inner-city teaching hospital in the SouthWest 200 women Inclusion criteria: active labor, using an epidural, and cephalic presenting fetus Exclusion criteria: on mag sulfate, signs of intrauterine infection, or cat III fetal heart rate	IV = Peanut Balls DVs = - Length of first stage of labor - Length of second stage of labor - Mode of delivery	- Reduction in first stage of labor by 29 mins with PB use - Reduction in second stage of labor by 11 mins with PB use - Women with PB use were less than half as likely to undergo cesarean surgery	Level II	Strengths: Randomized, controlled trial Controlled for confounders in statistics Study lead to a practice change in the hospital Limitations: Single facility No risk of harm identified Feasible for practice
6	Alvarado, Y. & Outland, L. (2019). Preventing cesareans with peanut ball use. *Journal of Nursing Education and Practice*, *10*, 107.	Retrospective Cohort Study Sample: women laboring with epidural anesthesia	Urban hospital in Southern California	IVs = Innovator Nurses, Peanut Balls DV = Mode of Delivery	- The average percent of vaginal deliveries for patients with epidurals increased 20% after peanut ball implementation	Level IV	Strengths: Nurse-driven intervention Used “innovator” nurses to drive change Limitations: Limited in outcomes that could be measured Unable to rule out confounding factors for results No risk of harm identified Feasible for practice

Appendix E

Outcome Synthesis Tables

Outcome Synthesis Tables

Outcome: Labor Duration	Articles					
	1	2	3	4	5	6
Length of First Stage of Labor	↓	NC	NC	↓*	↓	NE
Length of Second Stage of Labor	↓	NC	NC	NC	↓	NE

Symbol Key:
↓ = decrease in duration
↑ = increase in duration or occurrence
NE = not evaluated
NC = no change

* for primiparous women

Outcome: Mode of Delivery	Article					
	1	2	3	4	5	6
Vaginal Delivery	↑	↑	NE	NE	↑	↑
Cesarean Delivery	NC	↓	↓	NE	↓	NE

Symbol Key:
↓ = decreased rate
↑ = increased rate
NE = not evaluated
NC = no change

Appendix F

Seven Original Peanut Ball Positions

Premier Birth Tools
Give Birth With Balls

Seven Original Peanut Ball Positions

Side lying

Tuck Position

Semi Sitting Lunge

Fire-Hydrant

Pushing

Forward Leaning

Straddling

More information on Peanut Ball positions:

Grant, C. (2020). Peanut Ball Positions. 5 Pictorial Chart. ©Premier Birth Tools, LLC. https://premierbirthtools.com/store/peanut-ball-bundle-set-of-5-charts/

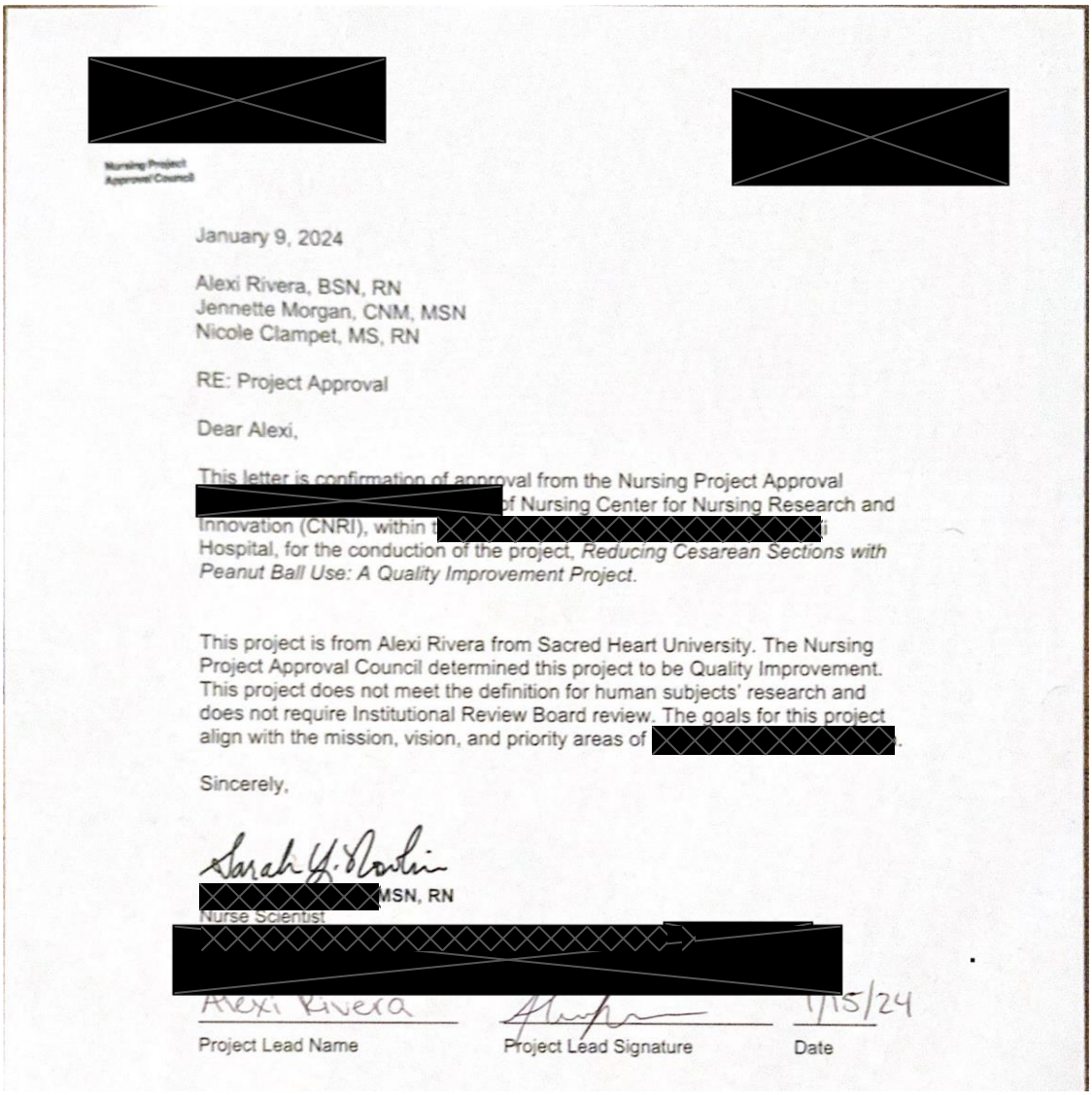
Comparison of the stirrup versus the Peanut Ball

Pelvic outlet not as open

Pelvic outlet more open

Appendix G

Hospital Project Approval



[redacted]

[redacted]

Nursing Project Approval Council

January 9, 2024

Alexi Rivera, BSN, RN
Jennette Morgan, CNM, MSN
Nicole Clampet, MS, RN

RE: Project Approval

Dear Alexi,

This letter is confirmation of approval from the Nursing Project Approval [redacted] of Nursing Center for Nursing Research and Innovation (CNRI), within t[redacted] Hospital, for the conduction of the project, *Reducing Cesarean Sections with Peanut Ball Use: A Quality Improvement Project*.

This project is from Alexi Rivera from Sacred Heart University. The Nursing Project Approval Council determined this project to be Quality Improvement. This project does not meet the definition for human subjects' research and does not require Institutional Review Board review. The goals for this project align with the mission, vision, and priority areas of [redacted].

Sincerely,

Sarah [redacted] MSN, RN
Nurse Scientist

[redacted]

Alexi Rivera — Project Lead Name
Project Lead Signature
1/15/24 — Date

Appendix H

QI Checklist

Differentiating Quality Improvement and Research Activities Tool
Reducing Cesarean Sections with Peanut Ball Use: A Quality Improvement Project

Question	Yes	No
1. Is the project designed to bring about immediate improvement in patient care?	X	
2. Is the purpose of the project to bring new knowledge to daily practice?	X	
3. Is the project designed to sustain the improvement?	X	
4. Is the purpose to measure the effect of a process change on delivery of care?	X	
5. Are findings specific to this hospital?	X	
6. Are all patients who participate in the project expected to benefit?	X	
7. Is the intervention at least as safe as routine care?	X	
8. Will all participants receive at least usual care?	X	
9. Do you intend to gather just enough data to learn and complete the cycle?	X	
10. Do you intend to limit the time for data collection in order to accelerate the rate of improvement?	X	
11. Is the project intended to test a novel hypothesis or replicate one?		X
12. Does the project involve withholding any usual care?		X
13. Does the project involve testing interventions/practices that are not usual or standard of care?		X
14. Will any of the 18 identifiers according to the HIPAA Privacy Rule be included?		X

Adapted from Foster, J. (2013). Differentiating quality improvement and research activities. Clinical Nurse Specialist, 27(1), 10–3. https://doi.org/10.1097/NUR.0b013e3182776db5

Appendix I

SHU IRB Communication

Fwd: IRB#231023B - Exempt Status Request

From: Samuolis, Prof. Jessica <samuolisj@sacredheart.edu>
Sent: Tuesday, October 24, 2023 8:51:10 AM
To: IRB <IRB@sacredheart.edu>; Samuolis, Prof. Jessica <samuolisj@sacredheart.edu>
Cc: Rivera, Alexi <riveraa6@mail.sacredheart.edu>; Budd, Prof. Geraldine M. <buddg2@sacredheart.edu>
Subject: RE: IRB#231023B - Exempt Status Request

Alexi,
Your request for IRB exemption is approved. Best of luck with your project.
Regards,
Dr. Samuolis
Acting IRB Chair

From: IRB <IRB@sacredheart.edu>
Sent: Monday, October 23, 2023 7:38 PM
To: Samuolis, Prof. Jessica <samuolisj@sacredheart.edu>
Cc: Alp, Feride F. 'Funda' <alpf1@sacredheart.edu>; Rivera, Alexi <riveraa6@mail.sacredheart.edu>
Subject: IRB#231023B - Exempt Status Request

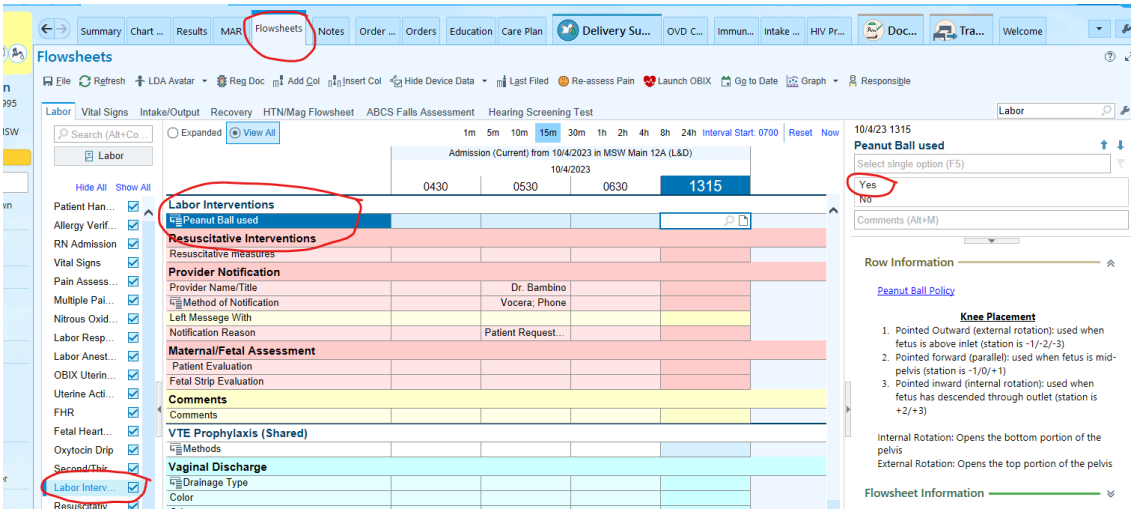
Dear Jessica,

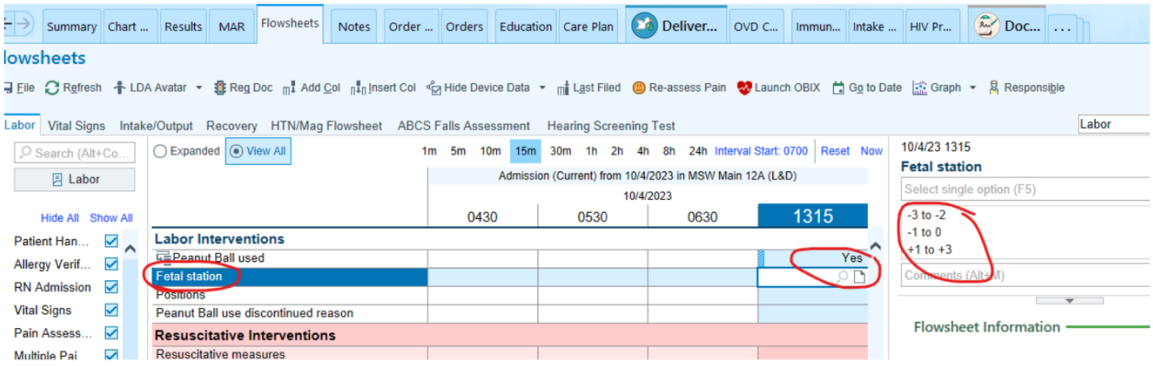
On behalf of Alexi Rivera, please find IRB#231023B for exempt status review.

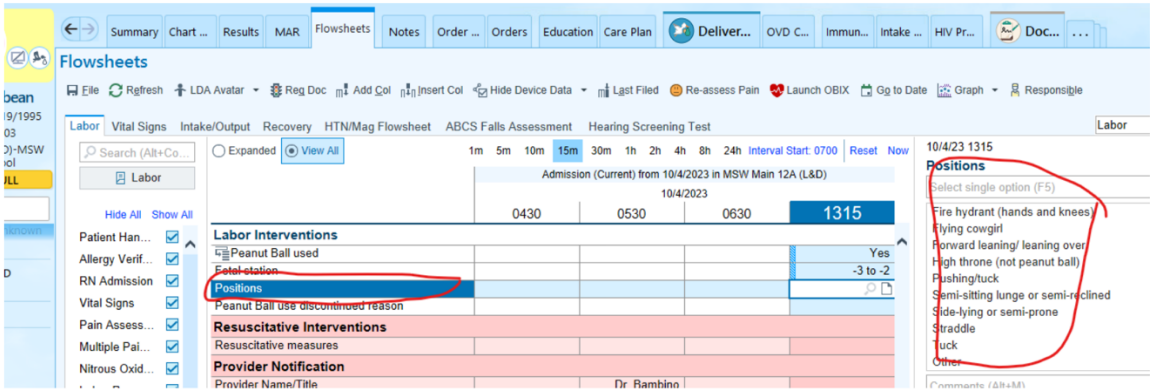
Best,
Madeline

Appendix J

EPIC Peanut Ball Documentation







Appendix K

Peanut Ball Proficiency Checklist

RN Name_____ RN Signature_____
Peanut Ball Trainer_____ Peanut Ball Trainer Signature _____Initials_____

Component	Competency Assessment Method	PB trainer Signature
Understanding of Peanut ball	State understanding of peanut ball	
Indications for use	verbalization: ➢ Used for laboring patients with and without epidural	
Contraindications	verbalization: ➢ Current or previous hip or pelvis injury ➢ Symphysis pubis dysfunction or injury ➢ Active or suspected DVT ➢ Ankle injury	
Research Findings	Discuss ➢ Lowers the first and second stage of labor as well as decreases cesarean and operative vaginal delivery rates	
Cleaning	Demonstration and verbalize ➢ Clean with soap and water ➢ Clean with hydrogen peroxide, not bleach!	
Storing	Discuss ➢ Cover clean ball with clear plastic bag ➢ Store in storage room, off ground, away from sharp objects and away from sunlight	
Covering PB during usage	Demonstrate - first cover with plastic bag - fitted sheet, patient gown, a commercial ball cover, chucks pads secured with band	
Knee Positioning	Demonstrate: - Patients should position their knees depending on fetal station	
Pelvis	Review and demonstrate:	

	- inlet→ -1, -2, and -3→ have the knees point outward to open the pelvis Midpelvis→ -1 to +1 station→ knees placed parallel to open midpelvis Outlet→ +2 or below, knees are pointed together and heels out to open the bottom of the pelvis	
Sizing	Demonstrate and explain: - Several sizes, one size does not fit all! - 40cm for smallest patient, 50cm is most popular size, 60cm used for tall clients, 70cm only ball used for sitting and straddling.	
Side-lying/ fire hydrant	Demonstrate: - ball placed between the client's legs while lying on their side	
Tuck**	Demonstrate: - place the ball as high as possible between the cleint's legs with leg over indentation - Bring the ball in close to the client as they are hugging it	
Fire Hydrant	Demonstrate: - place the client on hands and knees, and lower the bottom of the head. Have the client hang the baby and it can turn to the optimal position. Place peanut ball on the lower portion of the bed and place the client's leg on the peanut ball. Lower bottom of the bed.	
Forward Leaning	Demonstrate: - Lower the bottom of the bed, then have the client lean over the PB on their hands and knees. - have the baby hang to turn to the optimal position.	

Semi-sitting lunge	Demonstrate: - semi-reclined on the bed with one leg over the ball, at the knee, and the other leg on bed like a butterfly.	
Straddling	Demonstrate: - allows movement in two planes – a forward to backward movement and an up and down movement.	
Pushing	Demonstrate - hug the PB and pull both legs up to the chest to push.	
Documentation	Demonstrate how to document in EPIC - When peanut ball use started - what position/style - when peanut ball was discontinued	
Book and chart	Reference charts for positioning	
Power point	Review peanut ball powerpoint	
Youtube video	View youtube video	

Appendix L

Nursing Attendance to Peanut Ball Educational Inservice: Day and Night Shifts