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Use of the Peanut Ball to Decrease First and Second Stages of Labor

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Capstone Project

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Abstract

The purpose for this capstone project was to use a Peanut Ball, to mimic a sitting or squatting position, for decreasing length of first and second stages of labor. In addition, this project was designed to incorporate qualitative data on women's perception of using the Peanut Ball during labor. The project question was "For laboring women, will use of a Peanut Ball for positioning, as compared to no use of a Peanut Ball, decrease length of first and/or second stages of labor?" The results included a significantly longer second stage of labor in the intervention group (75.63 minutes) when compared with the control group (57.84 minutes). Qualitative data concluded 64% of women using the Peanut Ball stated it help facilitate progress of labor and 71% would recommend use of the Peanut Ball. Additional findings included the intervention group had a significantly higher (27%) use of passive descent during second stage (laboring down) when compared with the control group (9%). Cesarean section rates were reduced in the first and second months of the study ranging from 8.2% to 6.76%. Limitation included the groups were not homogenous or occurring at the same time. While the study didn't show a reduction in first or second stages of labor; the Peanut Ball received positive feedback from laboring women. In addition, a longer second stage was associated with an increased number of women using passive descent during second stage of labor and a reduction in primary cesarean section rates.

In 1738, Francis Mauriceau, French obstetrician to the Queen of France, started a movement to adopt a recumbent position for labor and birth. The recumbent position did not provide any benefit for laboring women but provided ease for an obstetrician to perform vaginal examination and obstetrical procedures such as application of forceps to deliver the baby (Caldeyro & Barcia, 1979). The recumbent position has since been the primary position for women during childbirth for the last 200 years (Cutler, 2012).

Historically, the ability to stand, sit, walk, and use vertical positions for childbirth has been well documented. An upright position has been recorded more than any other position for labor and birth (Cutler, 2012). A historical study completed in 1961 compared 76 cultures around the world and only 18% of women used a supine or dorsal position during labor and birth (Dundes, 1987).

The National Institute for Health and Clinical Excellence (NICE) recommends that women be encouraged to avoid using a supine position for childbirth (Culter, 2012). Freedom of movement during labor is one of four care practices developed by the World Health Organization (WHO) to promote, protect, and encourage vaginal birth (Romano & Lothian, 2008). However, in the U.S. current routine interventions prior to childbirth, such as induction of labor, artificial rupture of membranes with or without labor, continuous fetal monitoring, and epidural anesthesia typically create a supine or recumbent position by immobilization (Walker et al., 2012).

In addition, one out of every three women in the U.S. experiences a cesarean section delivery (AHRQ, 2012). Cesarean section is the most commonly performed surgery in the U.S. and is related to higher cost and increased risk of morbidity and mortality (AHRQ, 2012). Sixty-eight percent of cesarean section deliveries result from lack of fetal descent or progress of labor or concern for the babies' oxygenation level as assessed through the fetal heart rate monitor

(Spong, Berghella, Wenstrom, Mercer, & Saade, 2012).

Position changes during first and second stages of labor may provide many benefits for the patient including pain relief, maximizing blood flow, decreasing length of labor, and enhancing satisfaction with their birth experience (Priddis, Dahle, & Schmied, 2012). Conversely, lack of movement during labor has been associated with longer first and second stages of labor (Culter, 2012). Because the ability to change position in labor can decrease pain, create stronger uterine contractions, and allow normal fetal descent to avoid a cesarean section delivery, interventions that facilitate change are needed (Zwelling, 2010). The Peanut Ball is one tool to use for promoting progress of labor.

Purpose Statement

The purpose for this capstone project was first to examine processes to facilitate vaginal birth in a hospital setting and explain how positioning using a Peanut Ball, to mimic a sitting or squatting position, can aid in decreasing first and second stages of labor. In addition, this project was designed to incorporate qualitative data on women's perception of using the Peanut Ball during labor. The project question was "For laboring women, will use of a Peanut Ball for positioning, as compared to no use of a Peanut Ball, decrease length of first and/or second stages of labor?"

Literature Review

A literature search was conducted using search words: birth, position, positioning, upright position, labor support, continuous labor support, pelvic outlet, pelvic inlet, pelvic bone, dystocia, supine, and recumbent. Search engines included the National Guideline Clearing House, Medline, CINAHL, Up-to-date, Journal of Obstetric, Gynecological, and Neonatal Nurses, ProQuest, March of Dimes, and the Centers for Disease Control (CDC).

Literature review for this capstone project focused on positions during labor, especially upright positions. The studies reviewed and included focused on: pelvimetry, opening of the pelvic diameter, and length of labor with upright and recumbent positions.

Pelvimetry

Part of the natural progression of pregnancy is a change in a hormone, relaxin, producing a laxity of pelvic joints. This laxity creates musculoskeletal relaxation allowing movement of pelvic joints during pregnancy and childbirth (Baker, 2010). Michel et al. (2001) used magnetic resonance images (MRI) to measure differences of upright positions to the width of pelvic diameter. The sample size was comprised of 35 non-pregnant females within the ages of 22-42. A supine position was compared with two positions, hand-to-knee and squatting. Both hand-to-knee and squatting measurements of the sagittal outlet, interspinous diameter, and intertuberous diameter were significantly larger when compared with a supine position (Michel et al, 2001). Details of the measurements can be found in Table 1. A major limitation of this study was that the sample population measured was not pregnant. This sampling decision was made by the researcher due to limited space in the scanner and the ethics of scanning during pregnancy (Michel et al., 2001). However, information from this study provides evidence of how position can affect size of the pelvic diameter.

Upright Position with Length of Labor

Eight studies were reviewed for effect of position change on length of labor (Caldeyro-Barcis, 1979; Hodnett et al. 2013; Gizzo et al. 2014; Lawrence et al. 2013; Liu, 1974; Thies-Lagergren et al. 2012; Tussey & Botsius, 2011; and Zhang et al. 1996). Two of the studies, Caldeyro and Barcis (1979) and Liu (1974), are historical and referenced in current literature. All of the studies were randomized with the exception of the Cochrane Review by Lawrence et al.

(2013) which included quasi-randomized trials in the meta-analysis. Each study or review compared maternal position with length of first and second stages of labor.

Caldeyro-Barcia (1979) used intrauterine pressure catheters to measure strength of uterine contractions in an upright and recumbent position. To measure strength of uterine contractions the researcher created an internal measurement named Montevideo Units. Still used today, this measurement quantifies strength of contractions using baseline contraction intensity over a ten minute period. In the Caldeyro-Barcis (1979) study using Montevideo units, a vertical position measured 160 Montevideo units compared to a horizontal measurement of 129 Montevideo units. In addition, this study demonstrated with primiparous women an upright position labor was 78 minutes shorter in the first stage of labor and 45 minutes shorter in the second stage of labor.

Gizzo et al. (2014) compared women using an upright position with a recumbent positon and found they experienced a significantly shorter labor. The first stage of labor for women using a recumbent position was 5.6 hours. Women using any other position during a first stage of labor experienced 3.6 hours of labor. The second stage of labor was also shorter, 30 minutes compared with 75 minutes of women using any other position than recumbent.

Liu (1975) compared two positions, upright and supine. Women using an upright, standing, sitting, or squatting position experienced an 85-90 minute shorter first stage of labor and a 22-40 minute shorter second stage of labor.

Thies et al. (2012) reported a decreased first stage of labor by 68 minutes and an 11 minutes shorter second stage of labor. This study used a birthing seat to provide an upright position during labor. Tussey and Botsios (2011) demonstrated use of a Peanut Ball, to mimic a sitting or squatting position, between patients' legs. This study exclusively used left or right

lateral positioning or semi-fowlers position with the Peanut Ball. The first stage of labor was decreased by 90 minutes and the second stage of labor was decreased by 22 minutes (Tussey & Botsios, 2011).

Three meta-analyses were reviewed that also found describing shorter length of labor with changes in position and continuous labor support. The Cochrane Review by Hodnett et al. (2013) reviewed 22 randomized control trials supporting continuous labor support. Continuous labor support as defined by Hodnett et al. is supportive care incorporating emotional support, comfort measures, information and advocacy provided by one person during labor and birth without interruption. The studies concluded that women laboring with continuous support had significantly decreased length of labor MD [-0.58 hours 95% CIs [-0.85-0.31]. Hodnett et al. (2013) also described a subgroup analysis suggesting that having continuous labor support by someone other than hospital staff or part of the woman's social network was determined to be most effective. In addition, continuous labor support was deemed more effective in clinics not providing regional anesthesia. Continuous labor support enhances physiological processes of labor as well as provides a woman's ability to feel increased control during labor and birth. A woman having more control during labor reduces the need for routine interventions (Hodnett et al., 2013).

Lawrence et al. (2013) reviewed 25 randomized control studies on effect of walking, sitting, standing, and kneeling compared with recumbent positions noted as supine, semi-recumbent, and lateral. Overall the first stage of labor was decreased by 82 minutes. Length of second stage of labor was not significantly different when using an upright position.

The last meta-analysis, Zhang et al. (1996) reviewed a total of five studies. By using continuous labor support, labor was shorter by 180 minutes. Continuous labor support by nurses

provides time and opportunity for patients and families to ask advice and receive essential support for position changes during labor. Position changes are a key element in facilitating natural progression of labor (Romano & Lothian, 2008). Zhang et al. (1996) also noted effects of continuous labor support can extend into the postpartum period by increased mother-infant bonding and breastfeeding.

Position During Labor and Care Providers

Gizzo et al. (2014) notes effects of maternal position upon labor and birth are seldom agreed upon and remain controversial with maternal-child caregivers. Culter (2012) suggests caregivers should be trained to examine laboring women in an upright position. In order to support women to use upright positions during labor, caregivers need education regarding research validating use of an upright position during first and second stages of labor. Jansen et al. (2013) recommends care givers should be attentive to promote natural processes for labor and advocate for a culture promoting evidence based interventions that provide informed consent and alternative choices for labor and delivery interventions.

Priddis et al. (2012) identified literature about benefits and disadvantages of labor positions. Physiological birth position seems to be greatly influenced by preference and philosophy of health care professionals. Models of care and culture within facilities can also determine to what extent a woman can choose or will be offered an upright position. A lack of research exists regarding, exploring caregivers' perception of physiological birth positions and the impact upon laboring women (Priddis et al. (2012).

In summary, the literature supports a decreased length of labor by using an upright position. An upright position has been demonstrated through by walking, sitting, standing, and kneeling. Uterine contractions were found to be strongest during an upright positon, as

demonstrated by Caldeyro-Barcia (1979). By using MRI, Michel et al. (2001) demonstrated that pelvic diameters increase in width when using a squatting or hand-to-knee position. Eight studies validated when using an upright position, first and second stages can be significantly reduced. In addition, maternal position changes can be positively influenced by the availability of continuous labor support. Four studies recognized the need for education of maternal-child caregivers to support physiological aspects of labor through upright maternal positions.

Theoretical Framework

Rubin's theory of Maternal Role Attainment served as the framework for this project. Rubin is a seminal nursing theorist known for her "innovative and classical work about the mother's experience of pregnancy, childbirth, and maternal identity" (Sleutel, 2003). Rubin's landmark theory, first developed in the 1960's, identifies maternal identity as gradual, systematic, and extensive (Rubin, 1984). In 1967, Rubin introduced the concept of Maternal Role Attainment (Rubin, 1984). According to Rubin's theory, during pregnancy there is probabilistic certainty in a stage of great uncertainty. Due to the uncertainty women seek out other women for subjective experiences as a guide for the childbearing experience (Rubin, 1984).

Rubin described four tasks for the pregnant woman during pregnancy and childbirth: seeking safe passage for herself and child, ensuring acceptance of the child, binding into her unknown child, and learning to give of herself (Rubin, 1984). Application of Rubin's theory can be a framework for continuous labor support and use of a Peanut Ball. Continuous labor support, as defined by Hodnett et al. (2013), is supportive care incorporating emotional support, comfort measures, information and advocacy provided by one person during labor and birth without interruption. Women having continuous labor support experience shorter labors, have more

spontaneous vaginal birth, decreased use of intrapartum anesthesia, and have increased satisfaction during labor and birth (Hodnett et al., 2013).

The use of a Peanut Ball during labor can serve to facilitate a safe passage for a fetus during labor and birth. Safe passage can be enhanced by the Peanut Ball, mimicking a sitting or squatting position, to facilitate opening of the maternal pelvic diameters to support a vaginal delivery.

Methods and Procedures

Sample

The target population included nulliparous and multiparous women admitted to labor and delivery between May 12, 2014 and September 26, 2014. Inclusion criteria included women with a term singleton gestation and a cephalic fetal presentation. Exclusion criteria included women admitted prior to 37 week gestation or those scheduled for primary or repeat cesarean section.

Setting

The setting for the project was Baptist Health Louisville (BHL), a suburban 519 bed acute care hospital, located in Louisville, Kentucky. The labor and delivery unit is comprised of 19 labor, deliver, and recovery rooms. The number of deliveries per year is approximated at 3000. Care for the neonate includes a Level II Neonatal Intensive Care Unit.

Intervention

The Peanut Ball is a latex free peanut shaped vinyl exercise ball that can be used during first and second stages of labor to increase the width of the pelvic diameters. When used during labor, the Peanut Ball mimics a sitting or squatting position to maximize widths of the pelvic diameters. By maximizing the pelvic diameters, the fetus has the greatest capacity to descend for

vaginal delivery (Tussey & Botsius, 2011).

The Peanut Ball, placed between the patients' legs, was tested by Tussey and Botsius (2011) in a randomized control trial using position changes every one to two hours during the first and second stages of labor. The positions used were left lateral, right lateral or semi-fowler. The intervention group consisted of one-hundred seven women which started the use of the Peanut Ball after epidural placement. The control group consisted of 93 women who received standard care practices during the first and second stages of labor. The first stage of labor for the intervention group using the Peanut Ball compared with control group was shorter by 90 minutes. The second stage of labor was 22.3 minutes shorter for the intervention group when compared to the control group.

The Peanut Ball was introduced to the BHL L&D staff thru peer to peer education, mandated by the labor and delivery manager. The education included basic anatomy of the female pelvis and cardinal movements of the fetus during labor and delivery. Maternal upright positions with the use of a Peanut Ball during labor were taught by demonstration. Upright positions included: throne, C-position, side-lying right and left with calf support in stirrup, right lateral, and left lateral with a Peanut Ball. Return demonstration was completed by all of the nurses. In addition, when the project began, all nurses received one on one coaching when using the Peanut Ball with patients to ensure consistency of clinical practice. Review of frequency, diagnoses, and modifiable risk factors for cesarean section delivery were provided during the educational session. Upright positions were identified for modifiable risk factors of arrest of dilatation or descent during labor (Spong et al., 2012).

Part of the education session was dedicated for staff to share clinical experiences with positioning in labor. Most of the nurses' sharing focused on how communication between nurses

and physicians can be an effective way to promote use of multiple position changes and ask for additional time for passive fetal descent during second stage of labor.

Passive descent of the fetus during second stage of labor is commonly called "laboring down". Passive descent of the fetus is defined as a period of time without pushing after complete dilatation. It is an evidence based intervention to promote vaginal delivery, fetal well-being, and fewer perineal tears while decreasing maternal fatigue related to pushing (Osborne & Hanson, 2014).

Upright positions are also an important part of safe and effective pushing during second stage of labor. An upright position results in less negative maternal hemodynamic changes (Simpson, 2006). Scripting was developed to coach nurses on how to introduce the Peanut Ball to physicians and to ask for direction for a patient to participate in the study including passive descent during the second stage of labor.

The resources required for implementation of the Peanut Ball included the education for staff and purchase of the Peanut Balls. Six Peanut Balls were purchased and the staff received a two hour continuing education offering. Physicians were educated during patient care by nurses or by informational flyer so there was not a cost for physician education. Education for the patients and families was provided as part of the established childbirth classes without additional cost. The total cost of the implementation of the Peanut Ball was $6,749.95 (Table 2).

The Peanut Ball was first introduced to expectant parents through the hospital's prenatal classes. During prenatal classes, the randomized control trial by Tussey and Botsius (2011) was presented to explain the rationale for use of a Peanut Ball during first and second stages of labor. A Peanut Ball was available for participants to view, feel, and ask questions.

At admission, a plan of care using the Peanut Ball was explained to women including

need to sign consent to be included in the project. Upon patient agreement to participate, a consent was signed by the patient and the patient was given a copy of the consent. The education for patients included process of labor and how positioning can maximize pelvic diameter for baby to descend through the birth canal. A binder with pictures of positioning with the Peanut Ball was placed in each labor and delivery room available for review and discussion between patients and nurses.

Evaluation Plan

An evaluation plan is listed as Table 3. The evaluation plan addresses educational components for registered nurses and physicians. The education was a mandated program for registered nurses leading to 100% participation. Physician education was completed over a longer period of time, approximately one month, and had 100% participation.

Also included within the evaluation plan is the outcome of the capstone project, to decrease length of first and second stages of labor. The evaluation plan extends into the definition of first and second stages of labor in conjunction with reference to the benchmark research by Tussey and Botsios (2011). The data surrounding the comparison group is identified in the data collection approach of the evaluation plan. The comparison data were collected by chart reviews of patients during the same months in 2014.

Data Collection and Analysis Plan

Maternal charts were reviewed and data recorded with Microsoft Excel then analyzed on Statistical Package for Social Science software (SPSS 22). A p -value <0.05 was considered significant. Data recorded included: age and marital status. Clinical data included: gestation, gravida, para, length of first, second, and third stages of labor, and laboring past complete

dilatation.

For comparison, patient records were obtained from women admitted on the same dates in 2013. The groups are "nonequivalent", having not occurred at the same time nor randomly assigned to the intervention (Group 1) and comparison group (Group 2).

Qualitative data to describe patients' experience were obtained by the researcher visiting during inpatient postpartum days or phone calls. Two questions were asked "How did using the Peanut Ball enhance your labor and delivery experience?' and "What advice would you give other expectant parents regarding use of the Peanut Ball"?

Ethical Considerations/ Approvals for Implementation

On May 7, 2014 the researcher received IRB approval for the Peanut Ball as IRB #322. To obtain approval from the hospital, the researcher completed the required "Nursing Research Proposal Submission for Review/Approval and Evidence-Based Practice (EBP) Inquires and Questions" by the host facility. Permission was granted by email on May 12, 2014.

The Peanut Exercise Ball was offered to patients having the inclusion criteria and participation was voluntary, with signed consent. Each participant was identified by their hospital admission number. Names were excluded with the exception of signature needed for the consent form. There has not been any identified risk by the previous randomized control trial by Tussy and Botsius (2011) during labor and birth to the mother or baby. Standard infection control precautions were used to maintain cleanliness between patient use.

Barriers to Sustainability

Use of the Peanut Ball was driven by the labor and delivery nurses. The Peanut Ball was not part of a required intervention provided by any guideline, policy or physician order. The number of participants decreased each month as noted in Figure 1. The nurses in labor and

delivery either had patients not wanting to participate or the study wasn't introduced to patients. The decline of participation between the nurses and patients may be explained by the issue of the Peanut Ball adding to the workload of the nurses. Nurses were not requested to keep a log of patients declining participation or providing a reason for not participating during the project.

Results

Sample Characteristics

Between May 12, 2014 and September 26, 2014, a total of 299 women signed consent to participate using the Peanut Ball during first and second stages of labor. Two-hundred women were placed into the study, 66 were excluded due to not using the Peanut Ball during labor, 27 were excluded due to primary cesarean section, and 6 were excluded because treatment group couldn't be determined.

Demographical data of Group 1 and Group 2 are depicted in Table 3. The sample had a mean age of 29 years, 73% were married, and the mean gestational age was 39 weeks (Table 4).

The start of labor was divided in categories: spontaneous, elective induction, medical induction of labor, and spontaneous rupture of membranes. Group 1 included a greater number of patients admitted with spontaneous labor (54%) when compared with Group 2 (34%). Group 2 admitted 32 (16%) of patients with spontaneous rupture of membranes compared with zero (0%) within Group 1(Table 5).

Participants of Group 1 used the Peanut Ball in the following four positions: left lateral, right lateral, modified-sims, and throne. The greater percentages of use are associated with left and right lateral positions (Table 6). Most participants (76%) started using the Peanut Ball by six centimeters dilation. The mean amount of time the intervention group used the Peanut Ball was 327 minutes. The minimum was 5 minutes with a maximum of 1190 minutes.

Effect on Length of Labor

To compare Group 1 and Group 2 regarding length of labor, independent samples t-Test were used. The mean of first stage of labor was not significantly different between the two groups. It was found that Group 1 had a significantly longer length of second stage labor (75.63 minutes) compared with Group 2 (57.84 minutes). (Table 7).

Perceptions of Use

The qualitative data from the questions during postpartum are described in Table 8. Content analysis was used to summarize the comments. One-hundred eighteen participants gave input about use of the Peanut Ball (59%). Thirty-two percent of these women were interviewed prior to discharge from the hospital. The remaining 68% were interviewed by a follow-up phone call at home. Three main themes are noted from participants when asked about how use of the Peanut Ball enhanced their labor and delivery experience: (a) provided comfort, (b) helped progress labor, and (c) helped with positioning during labor. The second question, about recommendation to other expectant parents, had 75 (64%) responses of recommendation and 15 (13%) offering no advice. Of the 118 women, one shared that she experienced discomfort while using the Peanut Ball but felt it helped her progress during labor and would recommend use to another woman during labor.

Additional Findings

Other indicators of labor progression were also examined. Laboring down, coded as either present or absent, was determined present if maternal pushing started after 30 minutes of a completed first stage of labor. This amount of time between the intervention group and the comparison groups was also examined by Chi-Square. Group 2, having not used the Peanut Ball,

had a 9% rate of laboring down after complete dilation. Group 1, with use of the Peanut Ball, women had a significantly higher percentage rate (27%), of laboring down after complete dilatation [X^2= 4, *df*= 354.305, *p*= .000]. (Table 4).

The rates of cesarean section per month for the two groups are shown in Figures 2 and 3. Primary cesarean section rates were calculated for both cesarean sections with diagnosis of fetal intolerance to labor and without the diagnosis of fetal intolerance of labor. The rates were analyzed both ways since patients undergoing a cesarean section due to a concern about fetal heart rate oxygenation may or may not have been able to continue labor and have a vaginal delivery. The months of May and June, containing 54% of total participants, show a reduction of primary cesarean rate. May has an 8.2% reduction excluding fetal intolerance to labor and 6.76% with fetal intolerance to labor. June has a 3.19% reduction excluding fetal intolerance to labor and 6.79% with fetal intolerance to labor.

Discussion

Contrary to previous studies demonstrating a reduction of length of first and second stages of labor with position change during labor, this capstone project did not find a shorter length of first or second stage of labor with use of a Peanut Ball. In fact, this project found a longer second stage of labor without any significant difference in the first stage of labor.

The differences may have been related to the scripting presented during the nurses' educational sessions. As described, nurses were encouraged to collaborate with physicians and use passive descent during second stage of labor with the use of a Peanut Ball. The number of women experiencing passive descent of the fetus tripled in Group 1 when compared with Group 2. This increase also correlates with the longer second stage of labor in Group 1 when compared with Group 2.

The current project did not examine length of time pushing, but the significance of the longer second stage of labor may have provided the intervention group a more positive outcome as described by Tuuli, Frey, Odibo, Macones, and Cahill (2012). In their meta-analysis of 12 randomized control trials with a sample of 1,584 women without laboring down and 1,531 women with laboring down, several outcomes were described. Delayed pushing was associated with a longer second stage but a shorter duration of pushing. The women who delayed pushing had a 22 minutes shorter time period of pushing, which may decrease maternal fatigue. There were a higher number of spontaneous vaginal deliveries in the delayed pushing group (61.5%) compared with the group with immediate pushing (56.9%). Kelly et al. (2010) found that by delaying maternal pushing by 90 minutes, maternal pushing decreased by 51% without significantly increasing duration of second stage labor. Osbourne and Hanson (2007) contributed a longer second stage of labor with a vaginal delivery, promotion of oxygenation to the fetus, and protection of physiological structures through randomized control trials.

The qualitative findings of this evaluation support use of the Peanut Ball. One-hundred eighteen women responded with positive comments, based on experience using the Peanut Ball. Positive comments included that the Peanut Ball provided comfort, facilitated progress of labor, and helped with position. Psychologically, most women using the Peanut Ball had a positive experience and would recommend use of the Peanut Ball (71%). This positive experience may have included other physiological advantages as well promoting a safer birth experience. The only study which has used the Peanut Ball, Tussey and Botsius (2011), did not report qualitative findings regarding patient perception.

Limitations

This capstone project suffered from several limitations surrounding the sample. To begin,

the groups were not randomized, nor did they occur concurrently. Additionally, all women, any gravida, were included in the study. It is likely that patients presenting for induction of labor for any reason could alter results by having longer lengths of labor. Similarly, women having second or later babies would statistically have shorter first and second stages of labor. Future testing of Peanut Ball effectiveness should be done through a randomized control trial. The sample should be selected to ensure more homogeneity in regard to a first delivery with spontaneous labor. This would lead to exclusion of patients whose labors were more likely to be affected by other factors.

The Peanut Balls were prepared for use by the manufactures instruction. This included a two day process of putting air into the Peanut Ball. The instructions were to stop adding air to the Peanut Ball when palpation of the plastic was firm without indentation. The Peanut Balls were not measured for consistency of size at any time during the study. During the third month of the project, Peanut Balls in use were noted to be of various sizes. Difference in sizes of the Peanut Balls was attributed to staff letting air out of the Peanut Balls, feeling size of the ball was too large for their patient to use. At that time, every Peanut Ball was checked against manufacturer recommended of firmness and corrected. During the education sessions, staff was not instructed about maintaining the size of the Peanut Balls. Even though this was quickly caught by the researcher and staff accepted instruction not to alter the size of the ball, size differences could have altered results.

Staff members needed more detailed instruction on use of the Peanut Ball. The integrity of the size of the Peanut Ball needs to be consistent for the entire patient population. This instruction could include measurement of the Peanut Ball at the start of use with each patient. A record of patients choosing not to participate, with reason, would help to explain why numbers of participants decreased or increased. This would also delete concern regarding whether or not

staff members were asking patients to participate.

The charting system used by the nurses had a drop-down option added to choose specific positions using the Peanut Ball. These options were added to the computerized charting system to encourage documentation of the Peanut Ball. The documentation identified use of a Peanut Ball but failed to provide insight as to how the positions were chosen, changed, or how long a position was used. The nurses could have chosen the positions by collaboration with the patient, medical necessity, or personal choice. Documentation of position to include why a position was chosen, and who made the decision, could have provided insight into patient or nursing preferences. The qualitative data suggests that patient perception of comfort increased when using the Peanut Ball, but there is not a way to determine through the nursing documentation which positions or time frames was preferred or were more effective during use with patients.

The two questions providing qualitative data added essential insight of patient perception and responses with use of a Peanut Ball during labor. However, only 118 patients of 200 were able to be contacted after delivery either during inpatient postpartum days or by phone contact after discharge. Patient requests and comments regarding use of the Peanut Ball, recorded during labor, could add substantial information on what aspects of using a positioning device were favored or rejected. Having this part of the record during labor and delivery would allow all of the participants to provide comments regarding experience with use of a Peanut Ball. This information could be included within the information gathered about position choice and duration of use with the Peanut Ball.

Strengths

During the first few weeks, collaboration surrounding the Peanut Ball was successful between nurses and physicians. All physicians gave permission for their patients to use a Peanut

Ball during labor and some physicians would discuss the benefits of using a Peanut Ball to their patients. The collaboration allowed for nurses to use the scripted request, from the education sessions, regarding the ability to allow laboring down prior to maternal pushing. The intervention group experienced laboring down three to one compared to the comparison group.

The patients who were contacted during the postpartum period while in the hospital had positive comments regarding use of the Peanut Ball. This information was shared with staff as collected. Patients frequently stated how using the Peanut Ball helped their progression during labor. These comments could be due to the teaching of the nurses regarding the rationale of using a Peanut Ball to help with labor.

The researcher also noted nurses' positive comments regarding shorter labors and decreased amount of time pushing during second stage of labor with patients using the Peanut Ball. A collection of comments from staff would provide insight for future use of the Peanut Ball among nursing staff. The insight of the nurses could assist in how to approach a plan for sustainability of the project.

Though not the focus of this project, the reduction of cesarean section rates during the first month of using the Peanut Ball suggest that using a Peanut Ball may promote vaginal birth. However, this reduction is projected with caution due to the differences between the two study groups. Future study with a more homogenous samples population would provide further validity to this finding.

In conclusion, while this project did not find a shorter first or second stage of labor other indications appear to be promising. The sustainably of the use of the Peanut Ball during labor at BHL is uncertain. Currently, there is no documentation to show if patients are being introduced, educated, or encouraged to use the Peanut Ball during labor at BHL. This unsustainability is

further concerning due to the autonomy within the practice of nursing in labor and delivery. As the literature noted, education regarding benefits of position changes are lacking within caregivers. Dissemination of the findings within this project may support change in the perception of caregivers regarding the importance of positioning during labor. As caregivers understand the importance of positioning during labor, a culture of change can occur leading to use of a Peanut Ball during labor as a standard of practice.

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Table 1

MRI Measurements: Pelvic Bony Dimensions by Michel et al. (2001)

	Supine	Hand-to-knee	*p*=value	Squatting	*p*=value
Sagittal	11.5 cm	11.8 cm	0.002	11.7cm	0.01
Interspinous Diameter	11.0 cm	11.6 cm	0.0001	11.7 cm	0.001
Intertuberous	12.4 cm			12.7 cm	0.01

Table 2

Cost of Implementation of the Peanut Exercise Ball

Product	Cost	Quantity	Total
Peanut Ball (40cm)	$24.00	6	$144.00
Exercise Pump	$13.95	1	$13.95
Shipping	$92.00	1	$92.00
Continuing Education for RN	$25.00	(2 hours per RN)	$6500.00
Total			$6.749.95

Table 3

Evaluation Plan

Outcome	**Measure/ Operational Definition**	**Rationale for Measure Selection**	**Data Collection Approach**	**Benchmark**	**Improvement Goal**
Education of labor and delivery staff (RN) on the rationale and intervention of using a Peanut Ball during the first and second stages of labor to mimic a sitting or squatting position.	Determine the number (percent) of RN staff attending the education session. To determine: Number of RN attending an education offering (numerator) with the total number of RN staff	The RN in attendance of the educational offering can see the position changes demonstrated as well as discuss the research materials regarding position changes	Attendants will sign an attendance sheet.	None available	100% Attendance of RN staff attending an educational offering and completing an evaluation of the program.
Education of Obstetricians and Anesthesiologists on the rationale and intervention of using a Peanut Ball during the first and second stages of labor to mimic a sitting or squatting position.	Determine the number (percent) of the Obstetrician and Anesthesiologist providing care during for the nulliparous patient in the first and second stage of labor. To determine: Number of providers reviewing the position changes (numerator) with the to the total number of providers (denominator)	The physician care providers can understand the rationale of position changes of the nulliparous patient during the first and second stage of labor provided by the staff.	Provide physicians with one to one education and flyers in call rooms. Physicians will not sign an attendance sheet. A list of physicians having agreed to their have their patients participate in the study will be kept for reference.	None available	100% of physician providers will be provided either one to one education or view flyers in call rooms.
Length of first and second stages of labor	Determine the number of minutes in the First Stage of Labor (0-10 centimeters dilatation) and the Second Stage of Labor (Cervix 10 centimeters until delivery of neonate)	Determine if a Peanut Ball can assist in reduction of minutes of labor	Data was collected May 12 to September 26, 2014 from participants who have signed a consent form. Comparison data was collected May 12-September 26, 2013.	Tussey & Botsios, 2011	Data analyzed Fall, 2014.

Table 4

Demographics Characteristics of Sample

	Group 1 Mean (SD)	Group 2 Mean (SD)
Age (In Years)	29 (5.1)	28 (4.9)
Gestation (In Weeks)	38 (2.3)	39 (2.6)
Gravida	2 (1.5)	2 (1.0)
Parity	2 (1.0)	1 (0.7)
Marital Status		
Single	58 (29%)	44 (22%)
Married	140 (70%)	153 (77%)
Divorced	2 (1%)	3 (1%)

Table 5

Comparison of Labor Characteristics

	Group 1 (*n*=200)	Group 2 (*n*=200)	X^2	*p*=value
Start of Labor	68(34%)	108 (54%)	63.1	.000
Elective Induction	79 (45%)	68 (34%)		
Induction for Medical Reason	43 (22%)	24 (12%)		
Spontaneous ROM	32 (16%)	0 (0%)		
Frequency of Laboring Down	54(27%)	19 (9%)	4.321	.000

Table 6

Positions Used with the Peanut Ball

Position	Percent of Use
Left Lateral	152 (94%)
Right Lateral	187 (92%)
Modified Sims	45 (22%)
Throne	102 (51%)

Table 7

Mean Length of First and Second Stages of Labor by Group

Stage	Group 1 (*n*=200) M (SD)	Group 2 (*n*=200) M (SD	*t* value	*p* value
First Stage	487.34 (261)	443.50 (267)	-1.661	.096
Second Stage	75.6 (70)	57.84 (61)	-2.708	.007

Table 8

Qualitative Responses Regarding Participants' Experience (*n*=118)

How did using the Peanut Ball enhance your labor and delivery experience?	Total
Provided comfort	42 (36%)
Facilitated progress of labor	75 (64%)
Helped with positioning	15 (13%)
Helped baby move	4 (3%)
Helped my pelvis open	4 (3%)
Avoided a cesarean section	2 (2%)
Not sure	3 (3%)
No time to answer questions	4 (3%)
Wasn't most comfortable but helped me progress	1 (0.9%)

What advice would you give other expectant parents regarding use of the Peanut Ball?	
Recommend Use	84 (71%)
No advice	18 (15%)

Figure 1

Number of Participants using the Peanut Ball per Month 2014

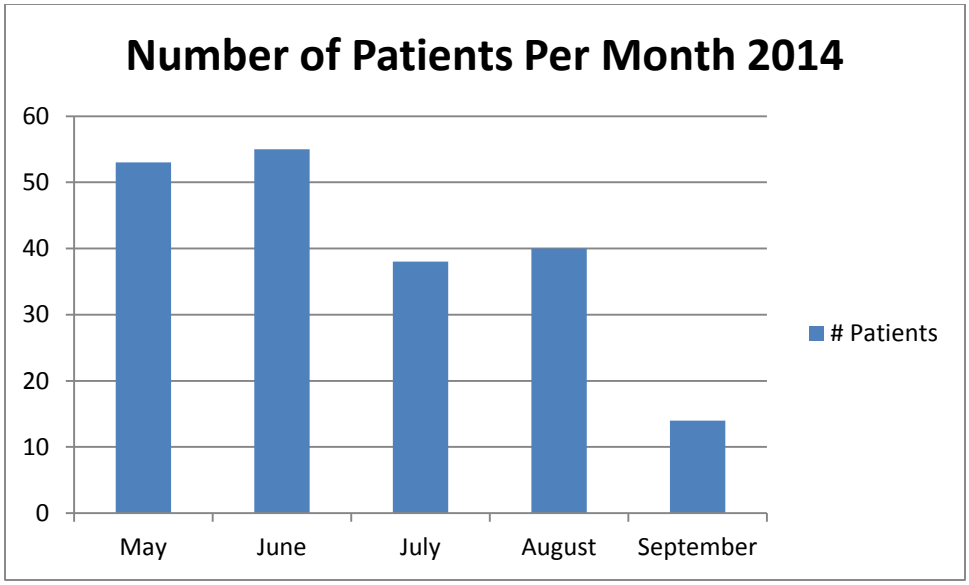

Figure 2

Percentage of Failure to Progress/Failure to Descend (FTP/FTD)

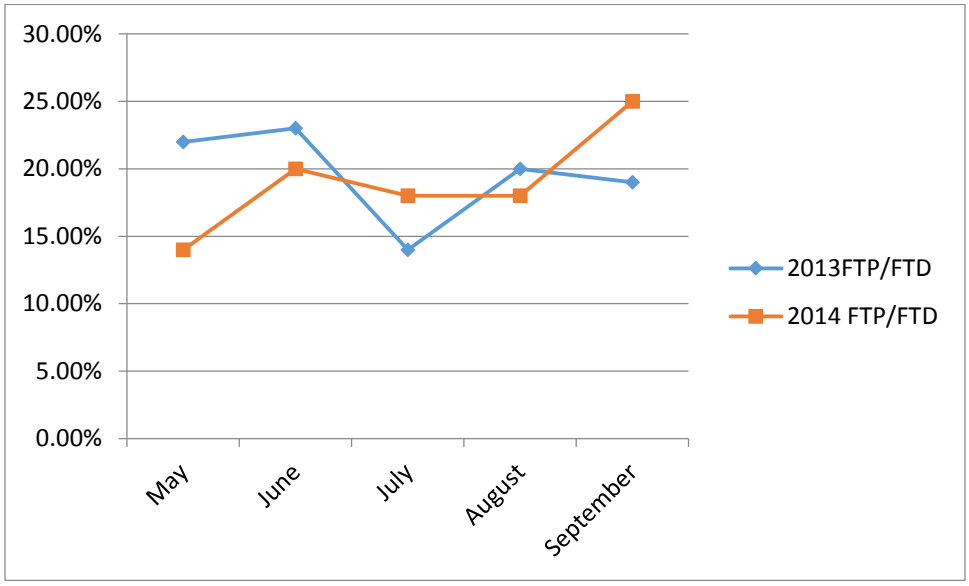

Figure 3

Percentage of Failure to Progress/Failure to Descend with Fetal Intolerance of Labor (FTP/FTD w/ FIOL)