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Bladder Management Post Epidural Anesthesia:

Impact on the Second Stage of Labor

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Abstract

Problem

Currently, no national practice guidelines or organizations suggest the use of continuous bladder catheterization during labor for women receiving epidural anesthesia (DeSevo & Semeraro, 2010). Despite there being no national practice guidelines supporting the use of continuous bladder catheterization, many labor and delivery units still utilize this method for bladder drainage following epidural anesthesia in labor. The purpose of this project is to evaluate if the type of bladder management post-epidural anesthesia affects the length of the second stage of labor and the mode of delivery after implementation of new intermittent catheterization pilot.

Methods

This quality improvement project implemented a new bladder catheterization nursing practice that encouraged independent voiding or intermittent catheterization rather than continuous bladder catheterization following epidural anesthesia for laboring women. The primary outcome measure was the length of the second stage of labor for women receiving intermittent catheterization compared to continuous catheterization. The secondary outcome measure was mode of delivery (vaginal or cesarean section).

Results

Data was collected via retrospective and prospective review of electronic medical records. Analysis of the data was completed using differential and inferential statistics, as well as chi-square test for categorical variables and ANOVA for continuous variables within the software Statistical Package for the Social Sciences (SPSS). The pre-implementation group sample size was 83 women, and the post-implementation sample size was 50 women. The Pearson Chi-Square test comparing the post implementation of

the new method of bladder management vs. the mode of delivery approached significance at $p=.060$ but was ultimately found not be statistically significant. The method of delivery in relationship to the length of the second stage of labor was significant at $p= .000$.

Implications for Practice

As a result of this evidence-based quality improvement project, a new bladder management protocol was successfully implemented. While the findings of this project were unable to fully statistically substantiate current literature supporting the use of intermittent bladder catheterization for women receiving epidural anesthesia in labor, clinically significant findings included a decrease in routine use of indwelling bladder catheterization. Further research and monitoring of this practice change is needed to determine its impact on this labor and delivery unit.

Bladder Management Post Epidural Anesthesia: Impact on the Second Stage of Labor

For many pregnant women who labor in the hospital setting, epidural anesthesia is often the preferred method for pain control in the United States. Epidural anesthesia provides many benefits to the laboring mother including the ability to labor mostly pain free, the ability to remain awake in the event an unplanned cesarean occurs, and pain control should a vaginal laceration repair be required post-delivery. Approximately 60% of all women laboring in large hospitals within the United States receive epidural anesthesia (Silva & Halpern, 2010). One challenge faced by nurses after their patient receives epidural anesthesia is the type of bladder management to utilize until their laboring pregnant patient delivers. Typically, the registered nurse implements a practice called continuous indwelling foley catheterization, in which the catheter remains in place following epidural placement until the laboring woman begins to push. While indwelling continuous bladder catheterization is convenient and is believed to prevent urinary retention in the laboring mother, there is little evidence to suggest continuous catheterization is superior to intermittent foley catheterization. Additionally, there is a gap in the literature regarding bladder management and its impact on the second stage of labor. Currently, no national practice guidelines or organizations suggest the use of continuous bladder catheterization during labor for women receiving epidural anesthesia (DeSevo & Semeraro, 2010). In a study conducted by Wilson, MacArthur, and Shennan (2009), researchers found that out of 1,000 subjects, four to fourteen percent of women were able to void independently throughout their labor following epidural anesthesia. Identification of what type of bladder catheterization, if any, is optimal for women receiving epidural anesthesia for labor pain and how these types of catheterization impact the second stage of labor is needed.

While continuous catheterization is the most widely used bladder management technique post epidural anesthesia, it is not without risks. Indwelling bladder catheterization, while appropriate for precise urinary output measurement in high-risk populations, can put patients at risk for developing catheter associated urinary tract infections (CAUTIs). Parker et al. (2017) found 12 to 16% of hospitalized patients received indwelling bladder catheterization with many being identified as inappropriate or unjustified. Catheter associated urinary tract infection represent close to 67% of urinary tract infections in the inpatient setting (Parker et al., 2017). There is little evidence to suggest continuous catheterization to prevent urinary retention in women laboring with an epidural is superior or justified in comparison to intermittent catheterization or voluntary voiding. Knowledge of bladder catheterization is essential for nurses to understand which scenarios warrant a patient be catheterized.

There is an opportunity for improvement in a suburban, midwestern hospital's labor and delivery unit regarding continuous bladder catheterization for all patients in the second stage of labor. The purpose of this project is to evaluate if the type of bladder management post-epidural anesthesia affects the length of the second stage of labor and the mode of delivery after implementation of new intermittent catheterization protocol. The aim of this project is to decrease the length of the second stage of labor by one-hour over a 3-month period. The primary outcome measure is the length of the second stage of labor for women of all ethnicities, ages 18-40, receiving intermittent catheterization compared to continuous catheterization. The secondary outcome measure is mode of delivery. The question for this study is: in nulliparous, low-risk, term gestation women receiving epidural anesthesia, what is the impact of intermittent catheterization or

independent voiding when compared to continuous catheterization on the length of the second stage of labor and the mode of delivery? The Iowa Model for Evidence Based Practice will guide this study.

Review of Literature

The literature review process began with the formulation of the clinical practice question. The search engines used included PubMed, CINAHL, NCBI, and Cochrane Library. Key search terms for this literature review were (intermittent or continuous) bladder catheterization, epidural anesthesia, obstetrics, labor, “second stage”, catheteriz* and the Boolean operators AND OR. The number of initial publications generated were 173. Inclusion criteria included pregnant women, receiving/received epidural anesthesia, continuous or intermittent bladder catheterization performed, low-risk, term pregnancy (\geq 37 weeks gestation), and singleton live pregnancy. Exclusion criteria for the refined search included non-pregnant women, women who did not receive epidural anesthesia, women not in labor, high-risk pregnancies, multiple gestation, and intrauterine fetal demise. After a refined search was created a total of 12 publications were generated, with 10 being selected for this literature review.

A brief understanding of the labor process and pain management techniques utilized in labor is required to understand thematic decisions behind bladder management techniques. While this project will explore the impact of bladder management on the second stage of labor, it is important to recognize other circumstances believed to impact this stage of labor. Women are often offered epidural anesthesia when they begin to actively labor. Thematic literature surrounding factors that impact the second stage of labor frequently include the mention of epidural anesthesia. According to Shmueli et al.

(2018), the second stage of labor can be defined as the length of time between when a woman's cervix becomes completely dilated until she delivers her baby. The length of the second stage of labor is impacted by many factors. These factors can include parity, size of the fetus, and the use of epidural anesthesia. Epidural anesthesia is a very common method of pain control for women who are actively laboring. Shen et al. (2017) states epidural anesthesia is the most effective type of pain management for laboring women however, multiple studies suggest differing opinions of its impact on the second stage of labor. The study conducted by Shen et al. (2017) found epidural anesthesia had no impact on the length of the second stage of labor, and in no way impacted a woman's ability to delivery vaginally. Conversely, Cheng, Shaffer, Nicholson, and Caughey (2014) found the length of second stage of labor can be prolonged by epidural anesthesia by up to two hours in both nulliparous and multiparous women. Shmueli et al. (2018) also concluded epidural anesthesia lengthened the second stage of labor. Women without epidural anesthesia had second stages of labor lasting 98 minutes in comparison to those with epidurals lasting 193 minutes (Schmueli et al., 2018).

Another important topic when considering the use of catheterization for the purpose of bladder management in labor is the appropriateness/necessity of the method chosen. In a study conducted by Laan et al. (2017), researchers explored the potential inappropriate use of both venous and urinary catheters in an attempt to decrease catheter related infections by 25-50%. Laan et al. (2017) found identification of appropriate indication for catheterization crucial for determining when urinary or IV catheterization is necessary. Laan et al. (2017) implemented findings creating the protocol RICAT (Reduce the inappropriate use of urinary and intravenous catheters). This protocol was

found not only appropriate for identification of misuse of urinary and IV catheters, but also cost effective. (Laan et al., 2017).

While it is important to determine who does not require bladder catheterization, it is equally important to understand what populations do require bladder catheterization. In a study conducted by Shinar, Rosenberg, and Ashwal (2019), researchers investigated what risk factors predispose women to postpartum urinary retention (PUR). Shinar et al. (2019) found women who experienced too few intermittent catheterizations during labor, had an increased duration of epidural anesthesia, or had extensive vaginal trauma were at an increased risk of developing PUR. While this study was limited by the small sample from a single hospital, it did explore reasons other than intermittent catheterization that contribute to PUR and suggests that some women with epidural anesthesia for extended periods do require continuous catheterization (Shinar et al., 2019).

In a foundational study conducted by Rivard et al. (2012) researchers aimed to explore the impact that intermittent catheterization compared to continuous catheterization had on the length of labor, hoping to disprove that continuous catheterization was superior to intermittent catheterization. Rivard et al. (2012) found no clinically significant difference in the length of labor based on the method of bladder drainage used. The cost of intermittent catheterization was found to be slightly less expensive in comparison to continuous catheterization (Rivard et al., 2012). While the duration of labor as well as cost and nursing preference were analyzed, the infectious potential of each method was not explored. Also, of note, the entire length of labor was analyzed instead of specifically the second stage of labor which can be different for spontaneous vs. induced labor (Rivard et al., 2012). Similarly, Suleiman et al. (2018)

investigated whether bladder catheterization technique specifically impacted the second stage of labor. Suleiman et al. (2018) found that the type of bladder catheterization did not statistically impact the length of the second stage of labor. However, it was determined that women who received intermittent catheterization or were able to void independently after epidural anesthesia faced fewer adverse effects related to catheter insertion which was an unexpected finding (Suleiman et al., 2018). Conversely, in a study conducted by Wilson (2015), researchers found that while there was not a statistical significance in length of the second stage of labor for women who received intermittent catheterization in comparison to continuous catheterization, women who received continuous catheterization were 28.8% more likely to have a cesarean section in comparison with those who received intermittent catheterization 9.9%. This study was limited as it was only performed at one institution, but is useful as it demonstrates the importance of considering how bladder catheterization techniques can impact the end goal of a safe vaginal delivery. (Wilson, 2015). Similarly, in a study conducted by Wilson, Passante, Rauschenbach, and Yang (2015), researchers also explored the impact that continuous catheterization in comparison to intermittent catheterization had on the length of the second stage of labor as well as postpartum urinary tract infection rates and the potential for a cesarean section. While it was concluded that there was no statistically significant difference ($p=.807$) in the length of second stage of labor for women who received intermittent catheterization in comparison to continuous catheterization, or that the incidence of UTIs was increased, researchers did determine that the risk of cesarean was increased (Wilson et al., 2015). Women in the continuous catheterization group were 27.3% more likely to have a cesarean in comparison to the intermittent catheterization

group 10.3% (Wilson et al., 2015). This study concluded that bladder catheterization should be avoided unless necessary, and if required, IC should be the initial choice (Wilson et al., 2015). Further research is required to determine if the mode of delivery (vaginal or cesarean) is impacted significantly by the type of bladder catheterization performed (Wilson et al., 2015).

Another prevalent theme in the literature surrounding this topic is the laboring woman's preference is for bladder management. In a study conducted by McClain, Burgess, and Coates (2019a), researchers evaluated if woman's birth experience was improved when she was an active participant in her bladder care or when her nurse offered her use of the bedpan (McClain et al., 2019a). Additionally, specific interventions thought to increase independent voiding success were explored, including water being poured over the perineum, turning on water, proper positioning on the bedpan, as well as offering privacy (McClain et al., 2019a). Women felt like active participants in their care when given a choice between using the bedpan or immediate catheterization (McClain et al., 2019a). While this study was limited by its small sample size, its findings suggested that 60% of women offered a bedpan after epidural anesthesia were able to void independently and the success of this was increased by 91% when nurses provided interventions to help (McClain et al., 2019a). Similarly, in another study conducted by McClain, Burgess, and Coates (2019b), researchers investigated women's feelings of empowerment over their birth when given the option to choose the type of bladder care provided. Women in the intermittent catheterization (IC) or independent voiding group stated feelings of control, participation, and capability with 70% appreciating being offered the bedpan rather than automatic catheterization (McClain et al., 2019b).

However, it was noted that some women did experience feelings of frustration at being unable to void. Women in the continuous catheterization (CC) group cited feelings of relief, ease, and convenience with the main negative themes being discomfort, pain, and stress (McClain et al., 2019b). This study reiterates that nursing staff should be able to assess a patients' voiding preference and how this may impact their sense of control and feelings of empowerment in labor (McClain et al., 2019b).

The Iowa Model will serve as an evidence-based practice framework to guide this project. According to Buckwalter (2017), the Iowa Model specifically details how an evidence-based project should be outlined. Purpose, priority, creating a team, gathering, and analyzing data are all important steps of this model (Buckwalter, 2017). If appropriate, data must be utilized to create a change model that guides the implementation of new protocols based on evidence (Buckwalter, 2017). According to Lloyd, D'Errico, and Bristol (2016), Doctor of Nursing Practice (DNP) students who utilized the Iowa Model as a guide for their projects reported a greater understanding of what approach was required to successfully implement practice changes or quality improvement. Also, steps outlined in the Iowa Model have aided students in gaining stakeholder interest and improved communication on all levels (Lloyd et al., 2016). The Iowa Model will serve as a guide to help organize, design, and outline this project. This model will also facilitate communication at various stages of data collection, dissemination, and implementation.

Method

Design

An evidence-based practice approach was utilized to complete this clinical scholarship project with an observational cohort design. Data was obtained using a retrospective and prospective medical record review from the electronic medical record system EPIC. Prospective data collected following the implementation of the new bladder management protocol following epidural anesthesia was analyzed and compared to retrospective CC data.

Setting

This quality improvement project took place at a suburban, midwestern hospitals 13 bed high-risk labor and delivery unit. Located in a community of approximately 8,801 people, this is the only hospital within this suburb serving a primarily urban population (United States Census Bureau, 2019). Women delivering their babies at this facility are patients of nearby federally qualified health centers, obstetric clinics, private obstetricians, and from outside communities who have been transported to this hospital for higher lever obstetric care. Approximately 85% of women at this high-risk facility receive epidural anesthesia. Employing approximately 90 registered nurses, this labor and delivery unit delivers between 200-300 babies every month. Other staff members that were influential in this project were labor and delivery management, resident physicians, attending physicians, and anesthesia providers.

Sample

Applicable pregnant patients were selected using purpose sampling. Pertinent charts from women who received CC from February 2019 through April 2019 were compared to those who received IC following implementation of new bladder management protocol from February 2021 through April 2021. Inclusion criteria included

pregnant women, receiving/received epidural anesthesia, continuous or intermittent bladder catheterization performed, low-risk, term pregnancy (≥ 37 weeks gestation), body mass index (BMI) ≤ 40 , and singleton live pregnancy. According to ACOG (2019), low-risk pregnancies include term gestation of a vertex fetus with no expected complications. Exclusion criteria included non-pregnant women, women who did not receive epidural anesthesia, women not in labor, high-risk pregnancies, multiparous, multiple gestation, women requiring strict intake and output measurement, BMI >40 , and intrauterine fetal demise. AGOG (2019) describes high-risk pregnancies as those involving complex maternal or fetal conditions that warrant a higher level of care should obstetric complications result.

Approval Processes

Approval for this project was first obtained by the unit director and managers of labor and delivery, as well as infection control at the hospital where this project will take place. Next, approval from University of Missouri St. Louis Doctor of Nursing practice committee and graduate school, as well as the university's institutional review board (IRB) was obtained. Minimal risks to patients existed with the application of appropriate coding and deidentification of confidential medical information following the retrospective chart review. Implementation of IC following epidural anesthesia for all women will potentially shorten the second stage of labor, decrease primary cesarean rates, and limit pathways for bacteria to be introduced.

Data Collection/Analysis

All electronic health records for this chart review were from pregnant, laboring women receiving epidural anesthesia for pain control. Specific demographics assessed

were age and race. In a study conducted by Sweeney and Raley (2014), researchers found that cesarean section rates among nulliparous women were impacted based on ethnicity and age. Retrospective charts from the months of February 2019 through April 2019 for women meeting inclusion criteria were analyzed. Specifically, the length of their second stage of labor and cesarean rates. All women within this timeframe would have received CC for bladder management. Similarly, prospective data from February 2021 through April 2021 was collected. All women within this timeframe received IC, voided independently, or met criteria to have CC placed. Data from February-April of 2020 was omitted due to the possible impact of the COVID-19 pandemic on delivery numbers. Patient identifiers were left out of all data collection and were coded as either B for before or A for after implementation. Data was stored within a spreadsheet on a password protected jump drive belonging to the researcher. A sample of the data collection tool is shown in Table 1. Analysis of the data was completed using differential and inferential statistics, as well as chi-square test for categorical variables and ANOVA for continuous variables. The chi-square test and ANOVA were completed utilizing the software Statistical Package for the Social Sciences (SPSS). The threshold for significance was set at .05.

Procedures

A meeting between key stakeholders including the labor and delivery director, team manager, and the unit practice council was conducted to discuss potential practices on this unit that could use improvement. The current practice of CC following epidural anesthesia was a topic of discussion. As CC is not currently supported by any national practice guidelines or organizations for women receiving epidural anesthesia, this was the

topic chosen for this quality improvement process (DeSevo & Semeraro, 2010). A decision was made and supported by stakeholders to implement a new pilot protocol allowing women the opportunity to void independently or be intermittently catheterized as needed following epidural anesthesia. Nursing interventions to promote successful independent voiding following epidural anesthesia were established. Determination of the need for IC was determined by the nurse if the patient was unable to void independently and based on the bladder assessment. Bladder assessments were completed and documented every two hours with IC only needing to be performed every two to four hours. Bladder assessment includes awareness of IV intake, inspection of the abdomen for a visually distended bladder, and palpation to determine if IC is needed. According to Rhoads and Petersen (2018) the examiner should be unable to palpate the bladder unless distended. A perinatal operations meeting attended by unit physicians was attended to discuss implementation of the new IC protocol and support was given. Physicians were educated and advised to select CC in the epidural order set only if patients are high risk or require strict intake and output assessment, eliminating the need for changes to the epidural order set wording. In the implementation phase of this project nursing staff were educated on interventions to improve successful independent voiding, criteria and timing of IC or CC, and proper charting of interventions. Extensive education was provided on how to appropriately perform a bladder assessment including, inspection and palpation of the abdomen. Physicians and resident physicians were updated and educated on the new practice change and how to properly order CC for a patient if warranted. Data collection began in February of 2021 and was completed by the end of April of 2021.

Results

Retrospective data collected from the months of February 2019-April of 2019 indicated that 83 mothers met inclusion criteria. A sample of the patient demographics including age (18-40), ethnicity, and the bladder management method utilized is shown in Table 1. Pre-implementation of the bladder management pilot, the average length of the second stage of labor (primary outcome measure) for women who received CC post epidural anesthesia was 74.87 minutes (SD= 68.14). The shortest recorded second stage was 5 minutes and the longest recorded was 405 minutes. The cesarean section rate prior to implementation of the bladder management pilot for women meeting inclusion criteria was 8.4%, with a vaginal birth rate of 91.6% (secondary outcome measure). After completing a Pearson Chi-Square for both age ($p=.338$) and race ($p=.075$) compared to mode of delivery there was not a statistically significant difference calculated for either category. Completion of an ANOVA test comparing age and length of second stage of labor ($p=.269$) prior to implementation showed no statistical significance however, a significant relationship between race and length of second stage of labor was identified ($p= .008$).

During the 12-week implementation phase of this quality improvement project (February 2021-April 2021), 57 mothers met inclusion criteria. Following the implementation of the bladder management pilot, the average length of the second stage of labor (primary outcome measure) for women who independently voided or were IC was 89.27 minutes (SD= 75.51). The shortest recorded second stage of labor was 6 minutes and the longest recorded was 306 minutes. Of the 57 mothers who met inclusion criteria, 7 of these women received CC. Of the women who received CC post-implementation, three received CC due to imminent cesarean delivery and 4 were given

CC without indication or documentation explaining the reason this method was chosen. The cesarean rate following implementation of the pilot for women who independently voided or received IC was 14% with a vaginal birth rate of 86% (secondary outcome measure). Calculation of a Pearson Chi-Square for age vs. mode of delivery ($p=.048$) was found to be statistically significant, while race vs. mode of delivery ($p=.127$) did not indicate a statistically significant relationship. Completion of an ANOVA test comparing race and length of second stage of labor ($p=.918$) post implementation showed no statistical significance however, a significant relationship between age and length of second stage of labor was identified ($p=.050$).

The Pearson Chi-Square test comparing the post implementation method of bladder management vs. the mode of delivery approached significance at $p=.060$ but was ultimately found not be statistically significant. An ANOVA test analyzing method of bladder management and length of second stage of labor was also found to be statistically insignificant. Finally, comparison of the mode of delivery between the pre-implementation sample and the post-implementation sample was found to be statistically significant ($p=.000$). Figure 1 displays the method of bladder management in comparison to mode of delivery for both pre and post implementation.

Discussion

Results from the research gathered from this quality improvement project were unable to validate current evidence-based practice recommending the use of IC following epidural anesthesia for laboring women. While the impact of the bladder management method utilized in relation to the mode of delivery approached significance ($p=.060$), ultimately these findings were statistically insignificant. Meaning that independent

voiding or IC in comparison to CC following epidurals anesthesia has no statistical impact on the length of the second stage of labor or the mode of delivery. There was however, a statistically significant relationship between method of bladder management in comparison to the length of the second stage of labor ($p = .000$). This relationship indicates that the type of bladder management utilized does drive the length of labor however data distribution is skewed due to the large difference in pre and post sample sizes.

It is important to note the large difference in the pre and post implementation sample sizes. This sizeable difference in sample sizes is possibly related to the COVID-19 pandemic and its impact on the United States birth rates. This hospital's labor and delivery unit experienced significantly lower patient volumes and birth rates. According to Hamilton, Martin, and Osterman (2021), the United States experienced a 4% decline in births from 2019 (3,747,540) to 2020 (3,605,201). The impact of the COVID 19 pandemic on the 2021 birth rates in the United States is yet to be seen.

All retrospective data collected from February-April of 2019 was prior to the COVID-19 pandemic with a total of 743 births. Data from 2020 was not analyzed due to the perceived impact that the national pandemic would have on birth rates. While it was presumed that the COVID-19 pandemic would likely end by 2021, this was not the case. Data collected from post implementation phase of February-April 2021 was still ultimately impacted by the pandemic. The total number of births from February-April 2021 was 577. This large difference in the pre and post implementation sample sizes was the biggest limitation of this study. Another limitation experienced early in the implementation phase of this project was push back from physicians regarding the safety

and necessity of this practice change. Ultimately, this concern resulted in a two-week period in the beginning of February 2021 where the project was halted until a meeting with lead physicians was held to discuss current evidence-based practice. Final approval was granted for the bladder management pilot to continue.

While data from this quality improvement project was unable to statistically substantiate current evidence-based practice recommending intermittent catheterization for women receiving epidural anesthesia, several important clinically significant outcomes occurred because of this project. The first clinically significant outcome was that this labor and delivery unit was able to decrease the number of patients receiving foley catheters or number of foley days, which is a national initiative. The potential benefits of this practice on both cost and infection rates will require additional research in the future. While there was not a one hour decrease in the length of second stage of labor for those independently voiding or receiving IC, this length of time did not increase based on the new pilot. Nursing staff was incredibly supportive during the implementation of this new practice and inquired as needed with questions on how to promote its success. While there was some hesitancy initially from providers, once the new bladder management practice was implemented, close collaboration between nursing staff and physicians was effective at making this practice change possible. This project proposes that additional research in the future be collected once the COVID 19 pandemic has ended and once birth rates return to pre-pandemic rates.

Conclusion

As a result of this evidence-based quality improvement project, a new bladder management protocol was successfully implemented. While the findings of this project

were unable to statistically substantiate current literature supporting the use of intermittent bladder catheterization for women receiving epidural anesthesia in labor, multiple clinically significant findings resulted including a decrease in routine use of indwelling bladder catheterization. There would likely be a benefit if future research is collected once the COVID 19 pandemic has ended. Continued monitoring and review of this new practice should continue to determine the long-term impact that this practice change has for women laboring with epidural anesthesia on this high-risk labor and delivery unit.

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Table 1

Demographic Data and Bladder Management Method

Variable	Pre-Implementation CC N (%)	Post- Implementation IV or IC N (%)
<i>Race</i>		
African American	51 (61.5%)	26 (52%)
Caucasian	24 (28.9%)	22 (44%)
Other	8 (9.6%)	2 (4%)
<i>Age Group</i>		
18-25	52 (62.6%)	32 (64%)
26-30	22 (26.5%)	7 (14%)
31-35	8 (9.6%)	5 (10%)
36-40	1 (1.2%)	6 (12%)
Total	83	50

Note. Continuous Catheterization=CC, Independent Void=IV, and Intermittent

Catheterization=IC

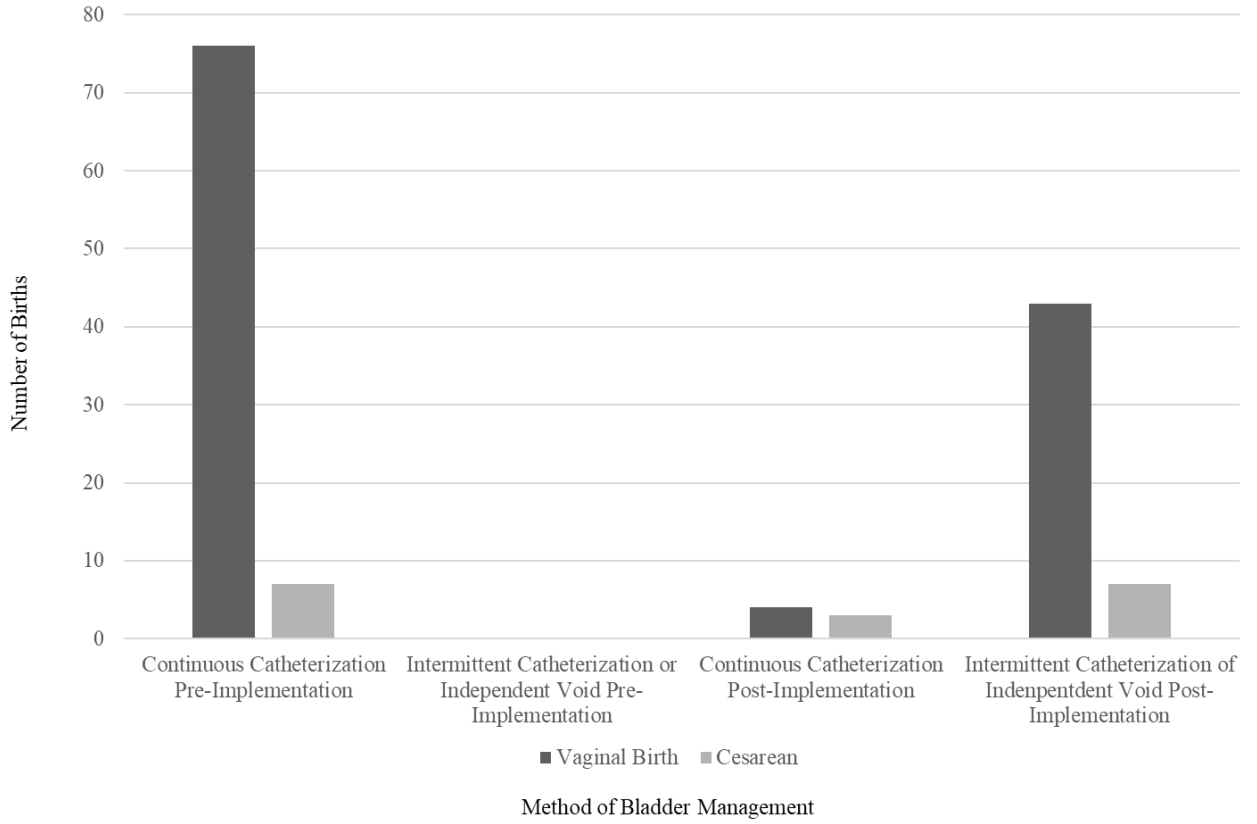


Figure 1. Method of bladder management in comparison to mode of delivery