

Water Birthing

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Abstract

This thesis will examine the question: “What are the benefits and consequences of water birthing?” Water-birthing is practiced as a procedure in hospitals, however, it is theorized that due to risks, it is rarely used. This synthesis will examine the literature regarding water births. Articles will be collected examining the perceived risks and benefits of water birthing in an attempt to understand why or why not water birthing is used. Articles will be collected on demographics in an attempt to understand how demographics influence birthing methods. This thesis will discover if the type of provider and/or support person during the birthing experience influences an individual’s decision to give birth in water. Comprehensive data collection will be exercised through CINHAL database to obtain explanatory reasoning and to offer support to this theory that due to its risks water birthing is rarely used.

Water Birthing

According to data from the Centers for Disease Control and Prevention, in 2010, 3,999,386 infants were born in the United States (CDC, 2010). Bringing a new life, or more, into this world is often accompanied by happiness and gratefulness as new mothers bring their babies home! There are many difficult decisions that must be made by pregnant women and their support system including what measures are going to be taken during labor and delivery, where the baby will be born, who will deliver the baby, what birthing method will be used, just to name a few. This thesis will focus on the investigation of water birthing and proposes the question “what are the benefits and consequences of water birthing?” Water birthing is the process of giving birth vaginally in a tub of warm water opposed to giving birth on land in a bed. Vaginal delivery is experienced by most women opposed to cesarean section which is giving birth through an incision into the mother’s abdominal wall. Cesarean sections are usually the result of laboring complications.

The use of water immersion during pregnancy, labor and birth has past history for being used for relaxation, pain relief and suggests that it may have benefits compared to other birthing options (Dahlen, 2013). Literature suggests that giving birth in water may “increase the elasticity of the perineum, reducing the incidence and severity of perineal trauma” (Dahlen, 2013, p. 759). Evidence will be collected examining the perceived risks and benefits of water birthing in an attempt to understand why or why not water birthing is used opposed to other birthing methods that are more commonly used. Articles will be collected on demographics in an attempt to understand how demographics including socio-economic status influence birthing methods. This thesis will also discover if the type of provider and/or support person during the birthing experience influences an individual’s decision to give birth in water such as a midwife.

Much research focuses on the benefits and risk of water birthing and supports the theory that it is safe for women and has many benefits for the mother as well as the fetus (Young & Kruske, 2012). Research has shown that water birthing can actually be less stressful on the fetus by ease of transition into extra uterine life because the fetus is transitioning into a like environment (Young & Kruske, 2012). This article will be used in this research to explore the demographics of women and their chosen water birthing method in order to determine what influenced their technique decision. An observational study will also be used to determine the impact of using a midwife opposed to other medical professionals in pregnant women's decision on birthing techniques. Current research suggests the use of a midwife has been associated with the reduction of cesarean sections, pharmacological analgesia, NICU admissions, and length of postnatal stay. This study suggests that depending on individual needs, the use of midwifery will affect women in different ways (Rayment, Murrels & Sandalls, 2015).

Risks and Potential Complications of Water Birthing

Newborn Risks

Research shows many concerns regarding water birthing including concerns for the mother as well as concerns for the neonate. In their article, *How Valid are Common Concerns Against Water Birthing*, Young and Kruske (2012) address newborn concerns including water aspiration, neonatal infection, and neonatal thermoregulation. Young and Kruske (2012) are able to respond to neonatal concerns by disproving the risks of water birthing by using evidence based research. There are number of inhibitor responses by the neonate that prevent the infant from inhaling water during a water birth.

Twenty four to forty eight hours before birthing the breathing rate slows down in response to an increase in Prostaglandin E2 levels, allowing for increased blood flow to feed vital organs in preparation for extra uterine life. In addition, this article explains how all babies are born with mild hypoxia, lack of oxygen, which in turn the baby actually uses as a defense mechanism against the water by causing the baby to swallow, not inhale decreasing the risk of aspiration (Young & Kruske, 2012). Additionally, another innate inhibitory response newborns are born with is called the “dive reflex.” This reflex performs closing of the glottis upon detection of any foreign stimuli to prevent aspiration of water or ammonia. This reflex allows the newborn to thus swallow, and not inhale (Young & Kruske, 2012). However, despite the newborns innate inhibitor responses many clinics still raise water aspiration as a critical concern against water birthing, thus keeping the risk for water aspiration a common concern among many mothers.

Neonatal infection and thermoregulation are also common concerns for clinicians and mothers when considering water birthing as an option. Neonatal infection is often a concern due to the contamination of the water by forces such as fecal matter or unclean pipes (Young & Kruske, 2012). The possibility of the water in which birth occurs being greater or less than that of the mother’s temperature has raised the concern for ineffective neonatal thermoregulation. The unborn fetus is dependent on the mother for thermoregulation and therefore temperatures much higher or lower than that of the mother’s may lead to hypothermia or hyperthermia (Young & Kruske, 2012). However, such a concern as this one can be monitored closely and adjusted to ensure proper thermoregulation.

Maternal Risks

Maternal infection, thermoregulation, and peritoneal trauma are all areas of maternal risks during water-birthing. Maternal infection has been identified as a maternal risk of water birthing. However, the risk of maternal infection due to the possibility of contaminated water entering the uterus and blood stream of the mother has been strongly contested (Young & Kruske, 2012). Maternal thermoregulation can be monitored and adjusted to ensure proper temperature environment for the mother (Young & Kruske, 2012).

There is discrepancy in the area of peritoneal trauma related to water birthing. With water-birthing still being a form of vaginal delivery the mother is still at an increased risk of peritoneal trauma from an accidental tear (Hastings-Tolsma, Vincent, Emeis, & Francisco, 2007). A study conducted by Hastings-Tolsma et al. (2007) reported that 65% of all vaginal deliveries result in peritoneal trauma. However, this study found that there is lack of sufficient evidence to relate the use of some interventions such as birthing in water or massaging the perineum to decrease the perineum from lacerations (Hastings-Tolsma et al., 2007).

A second evidenced based journal was reviewed that examined the incidence rate of peritoneal trauma linked to water-birthing that conflicted with the research findings of Hastings-Tolsma. Haith-Cooper (2016) identified uncontrollable risk factors for peritoneal trauma being primiparity, instrumental birth, ethnicity, heavier babies, maternal age, and body mass index. Controllable risk factors included birthing techniques, and different birthing positions, one of which is water-birthing (Haith-Cooper, 2016). A systematic review was conducted by Haith-Cooper (2016) and found that water birthing increases the risk of perineal trauma.

This systematic review incorporated two different studies in their review which resulted in discrepancy between the two studies. One study completed by Cortes, Basra, and Kelleher (2011) found that there were more second-degree tear occurrences than intact perineum and first-degree tears in primagravid women, but more intact perineum in multipara women (Haith-Cooper, 2016). Cortes et al. (2011) also found there were more third and fourth degree tears with water birth compared to land birth.

The second study incorporated into this systematic review was completed by Mollamahmutoglu et al. (2012) who concluded that compared to birthing on land there was a general increase in the incidence of perineal trauma in water birthing (2016). These findings conflict with previous research which found no difference between trauma rates on land compared to water-birthing (Haith-Cooper, 2016). Further research needs to be conducted to include the length of immersion in water during labor and the resulting outcomes to determine if water birthing increases the risk of perineal trauma. Cortes et al. (2011) suggests that because of the increase in perineal elasticity in water there was a resulted less time for the tissues to stretch, thus resulting in a tear (Haith-Cooper, 2016).

Outcomes of Perceived Risks

Four prospective observation studies comparing water birth to land birth were conducted and used as evidence in support of water birthing as a minimal risk for water aspiration. Randomized controlled trials examining the potential association between water birth and water aspiration have not yet been conducted. This pediatric study surveyed 1,500 pediatricians over a two year period and asked them to report cases where neonatal death or admission to further care was needed within 48 hours of birth. Within these four observation studies a total of eight cases were examined and identified a need for treatment within 12 hours of birth related to water

aspiration (Young & Kruske, 2012). However, all of the babies in the cases made a full recovery and were discharged from the hospital within eight days of birth. The relationship between water birthing and water aspiration was not established within any of these case reports (Young & Kruske, 2012).

In a trial performed by Nikodem (1999) examining neonatal infection rates with water birthing in comparison to birthing on land, Nikodem found that there was no association with increased neonatal infection rates and water birthing. This trial was conducted and evaluated in terms of raised neonatal temperature at birth as well as positive swabs for infection from the newborn's ear, mouth of umbilical cord. Another study discussed by Young and Kruske (2012) compared 301 water births to 301 land births over the span of five years and also found no difference in maternal or neonatal infection rates, supporting the premise that water birthing does not increase the risk of maternal or neonatal infection. Trials examining maternal infection to water birth were unable to be located.

In regards to maternal and neonatal thermoregulation a several studies that were conducted showed that there were no difference in maternal temperature between land and water birthing groups. A study assessed by Young and Kruske performed by Geissbuehler (2002) compared the maternal and neonatal temperature across a span of eight years. Over the eight years 10, 775 births were recorded and showed that neonatal and maternal body temperatures did not differ between those who birthed in water compared to those who birthed on land. These findings were legitimized by factors that allowed for concurrent data including the constant recording of body temperature, water temperature and duration of bath time for each case (Young & Kruske, 2012).

Benefits of Water Birthing in Comparison to other Birthing Options

Water Birthing Benefits

Although there are many maternal and newborn concerns following child birth, research shows that there are many benefits. It's time to examine whether or not the benefits outweigh the risks. Giving birth in water has benefits for the mother as well as the newborn. Specifically from the mother's standpoint water birthing has been proven to aid in relaxation, facilitate position change and has been reported as an overall increase in satisfaction with the birthing experience (Young & Kruske, 2012).

Benefits for newborns have also been documented which include, ease of transition into extra uterine life thus reducing the need and therefore side effects of any needed pharmaceutical analgesia. Water immersion is also associated with a reduced use of epidural analgesia, reducing the risk for side effects for the mother (Young & Kruske, 2012). A study conducted by Dahlen et al. (2013) aimed to determine the rates of perineal trauma, post-partum hemorrhage and five minute Apgar scores among low risk women in a birth center. Records were kept by midwives for a total of twelve and a half years from January 1996 to April 2008. This study compared and contrasted these parameters against women who gave birth in water compared to six other positions on land. Water birthing contributed to 13% of women, kneeling on all fours was 48%, semi-recumbent 12%, lateral 5%, standing 8%, using a birth-stool 10% and squatting 3% (Dahlen, 2013).

This descriptive cross sectional study of births followed women who chose the various forms of birthing methods and compared their outcomes to those of women who chose to water birth. Dahlen found that birthing on a birth-stool led to a higher rate of major perineal trauma

(Table A1, Dahlen, 2013) that consequently led to second, third, and fourth degree tears as well as episiotomy and post-partum hemorrhaging (Table A2, Dahlen, 2013). Apgar scores were monitored and charted to prove that water birthing led to greater Apgar score than those who gave birth in a semi-recumbent position (Table A3, Dahlen, 2013). Those born in a semi-recumbent position had significantly greater incidence of five minute Apgar scores being <7 (Dahlen, 2013).

In conclusion, water birthing compared to six other on land birthing options proved to lead to greater positive outcomes. Infants born through water birth had greater Apgar scores, less maternal major perineal trauma, and lesser chance of post-partum hemorrhage (Dahlen, 2013). With the support of this study greater support has been identified to support water birthing as a safe, practiced birthing method compared to six other birthing methods.

Alternative Birthing Options

Cesarean Section

A cesarean section is an alternative birthing option for women. A cesarean section is the delivery of a baby through a surgical incision into the abdomen and uterus. Often times, a cesarean section is a planned and scheduled in advance but other times it is a result of unforeseen complications that developed during the laboring process. Cesarean section as an alternative to a vaginal delivery offers a variety of risks for the fetus and the mother including infection, excessive bleeding, blood clots, more postpartum pain, a longer hospital stay, and a significantly longer recovery (Babycenter, 2016).

Risks of cesarean section. The risk of infection increases with a cesarean section compared to a vaginal delivery due to the major surgery that is completed. A study completed

by Assawpalanggool et al. resulted in the conclusion that having a cesarean section increases the risk of infection (Assawpalanggool et al., 2016). This study included a total of 5,122 patients who underwent cesarean sections. 2.6% of the total participants were lost through follow up after discharge so the total number of participants was 4,988 patients. 293 patients (5.9) encountered cesarean surgical site infections (Assawpalanggool et al., 2016). Of these infections 17.1% were classified as incisional surgical site infections, and 6.2% were classified as deep incisional surgical site infections (Assawpalanggool et al., 2016). These infections were directly related to the occurrence of a major surgery.

Babies who were delivered by C-section before 39 weeks were shown to be more likely to have breathing problems compared to those babies who were delivered vaginally (Babycenter, 2016). In addition to breathing difficulties, mothers who have had previous C-sections have an increased risk for complications such as placenta previa and placenta accrete (Babycenter, 2016).

Benefits of cesarean sections. Cesarean sections are often warranted due to labor and or delivery complications. Sometimes a cesarean birth is needed to save the life of the baby or mother, making the option of a cesarean section the safest option. Research in this area of benefits is limited and further benefits of cesarean sections could not be obtained.

Upright Positioning

Upright positioning is another birthing option to consider. Birthing in an upright position is when the mother uses an adjustable birthing bed to sit upright opposed to lying supine in a lithotomy position which is the position that most women assume for labor and delivery. Common upright positions include sitting on the side of the bed, standing, squatting with partner support, sitting in a chair, throne position, squatting using bar, side-lying upright, and kneeling.

The use of the upright positioning is supported in several studies because of its increased rates of cervical dilation and the use of fewer instrumental vaginal deliveries because of the effects of gravity (Mayberry, Strange, Suplee, & Gennaro, 2003). Although sitting position has some benefits there are still other factors to consider such as the use of an epidural and the use of the sitting position. A study completed by Mayberry et al. (2003) evaluated the effectiveness of the sitting position when an epidural is in place and the risks that are associated with it.

Risks of upright positioning. During Mayberry et al.'s study 74 women participated and were encouraged to assume a variety of upright positions throughout the laboring experience (2003). In the final sample of 74 women who labored in the upright positioning 79.7% of the women had uncomplicated spontaneous vaginal deliveries (Mayberry et al., 2003). Four of the women had instrumental deliveries because of maternal exhaustion, non-reassuring fetal heart tracing, fetal position, and physician preference. Three of the laboring women had to have cesarean births because the baby's failure to descend (Mayberry et al., 2003).

Limitations to upright positioning included age and physical condition of laboring women. Women who were younger seemed to be more flexible and able to assume squatting positions better than those who were older and less flexible (Mayberry et al., 2003). Women with heavier body weights experienced more difficulty when trying to assume squatting positions and required more assistance from their nurses and partners (Mayberry et al., 2003). Body weight, age, and general physical health presented as limitations of this study and participants ability to assume certain birthing positions. Safety was a general concern with women who had received an epidural and wanted to labor in an upright position. Protocols to ensure safety were put in place to determine how much physical support was necessary to ensure the patient's safety (Mayberry et al., 2003).

Benefits of upright positioning. Seventy nine percent of women who labored in an upright position experienced uncomplicated spontaneous vaginal deliveries (Mayberry et al., 2003). Apgar scores were conducted at one minute and five minutes post-delivery and were positive. At one minute 86.5% of neonates scored seven or greater, and 97.5% of neonates scored seven or greater at five minutes post-delivery (Mayberry et al., 2003). Many women receive epidurals during their laboring experience to reduce pain and stress that is placed on the fetus. Epidurals affect a laboring women's ability to feel pain and increases the difficulty in controlling motor abilities. Mayberry et al. (2003) suggests that after assessing motor ability after the administration of an epidural that upright position should be encouraged! The upright position increases the pelvic diameter, decreases the duration of the second stages, minimizes pain intensity, decreases the risk for perineal trauma, and enhances maternal satisfaction with the birthing experience (Mayberry et al., 2003). Another benefit of assuming multiple upright laboring options women reported "that frequent position changes decreased their feelings of fatigue and made them feel "more in control" of their pushing endeavors, while others were content to remain in one position" (Mayberry et al., 2003, p. 157).

Lithotomy Position

The lithotomy position is another option for labor and delivery. The lithotomy position is described as lying supine with the legs separated, flexed and supported in stirrups. The lithotomy position is used the majority of the time globally in the USA, Australia, and Canada (Diorgu, Steen, Keeling & Mason-Whitehead, 2016). Although the lithotomy position has been reported to be convenient and helpful for the midwife or other healthcare provider many laboring women found this position to be unhelpful in pain management and delivery of their baby (Diorgu et al., 2016). A study by Diorgu et al. (2016) discusses the rate of women laboring in

the lithotomy position and identifies the prevalence of other birthing methods and the incidence of episiotomies. This study will also explore the mother's perspectives of birthing positions and perineal trauma (Diorgu et al., 2016).

Risks of lithotomy position. Many other studies have associated the lithotomy with negative outcomes such as an increase in peritoneal trauma including a study by Diorgu et al. (2016). A study by Diorgu et al. (2016) including 110 mothers and 110 midwives was completed to measure the association between peritoneal injuries and delivering in the lithotomy position. A cross-sectional study was carried out to “compare maternal semi-recumbent position with lateral, squat-ting, standing, and hands and knees positions during the expulsive phase of second stage of labor and found that semi-recumbent represented a greater risk for 2nd degree tears and the performance of episiotomy” (Diorgu et al., 2016, p. 519).

Research identified the use of the lithotomy position as a higher correlation with the occurrence of an episiotomy. Sixty eight of the 110 mothers who birthed in the lithotomy position had an episiotomy, however only 34 of those women were informed about having it done (Diorgu et al., 2016). Furthermore, some mothers stated that local anesthesia was not even administered before the episiotomy was completed (Diorgu et al., 2016). Birth related tears also occurred on their own in 30% of the cases of a perineal tear (Diorgu et al., 2016). In addition to previously stated risks of the lithotomy position, Mayberry et al. (2003) found an increase of supine hypotensive syndrome in women during the third trimester of pregnancy in those women who maintained the lithotomy positioning.

Benefits of lithotomy position. Benefits of the lithotomy position were seen in the eyes of the midwives assisting in deliveries more than the mothers themselves (Diorgu et al., 2016).

Sixty five out of 110 midwives in Digorgu et al.'s study found the lithotomy position to be helpful to themselves during delivery (2016). Although the majority of women answered that they would prefer a different birthing position 47 out of the 110 mothers found the lithotomy position to be helpful to themselves (Digorgu et al., 2016). No other benefits of the lithotomy position were presented.

Demographics influence birthing method

Low socioeconomic status

It is no secret that inequalities exist across the western countries in pregnancy and birth outcomes. There is a widening gap occurring in inequality with women and children from low socio-economic backgrounds that have been shown to have detrimental consequences (Rayment-Jones, Murrels, & Sandall, 2015). Evidence shows an association between socially disadvantaged pregnant women and experiencing low-birth weight, preterm birth and twice as likely to give birth to a stillborn (Rayment-Jones et al., 2015). These adverse effects are related directly to the lack of prenatal care, antenatal care and the participation in pregnancy services aimed to encourage a healthy pregnancy. Through the lack of services, women with low socio-economic status were often undereducated and experienced gaps in access to affordable care. All of these factors contribute to poor pregnancy outcomes for both the mother and baby (Rayment-Jones et al., 2015).

Author in his study Rayment-Jones et al. (2015) discovered that throughout his study with pregnant women with a low socio-economic status, that the women who did not receive care through a midwife there was a lower number of water birthing, laboring and use of water for pain management. There was a direct correlation found there was no supportive explanation as

to why this increase with the use of water occurred (Rayment-Jones et al., 2015). It may be thought to be correlated to the relationship built with the patient and the midwife and the education provided by the midwife. Women with low-socioeconomic status often experience a of lack of education so it can be theorized that with the education of the mother has surfaced the understanding of the risks and benefits of water birthing which in turn increased the number of water birthing experiences. In conclusion, it is theorized that there is a relationship between educating women with low-socioeconomic status with their options will increase the number of women who choose to birth in water (Rayment-Jones et al., 2015).

Type of provider

Determining the type of provider during pregnancy is at the top of the list of importance. Among the list of options includes midwives. A midwife is a healthcare provider who differentiates from other medical personnel by addressing the health needs of women from puberty through and beyond menopause (Midwifery, 2016). A midwife provides care through labor and birth as well as support during the transition into parenthood. Certified nurse midwives (CNMs) and certified midwives (CMs) have advanced education that are also educated to provide gynecologic needs (Midwifery, 2016). Determining a healthcare provider throughout pregnancy may be difficult but many options are available.

Study One

An article completed by Rayment-Jones, Murrells, & Sandall (2015) discussed a study completed in the United Kingdom including 194 pregnant participants. The purpose of this study was to discover whether or not childbirth outcomes and processes of birthing for women with complex social factors changed based on whether or not midwifery care was given opposed

to standard maternity care. Out of the 194 total participants 96 of them were to receive standard maternity care and 98 of them were to receive midwifery care (Rayment-Jones et al., 2015).

At the end of this study it was concluded that midwifery care increased benefit and reduced harmful outcomes for both the mother and baby. However, this study discovered that the type of care chosen and the outcomes were NOT changed by the inclusion of confounding social factors. Women who received midwifery care experienced more spontaneous vaginal childbirth (80% versus 55%), use water for pain relief (32% versus 10%), give birth in a midwife led center (26% versus 13%), take part in an assessment by 10 weeks gestation (24% versus 8%), a shorter postnatal stay (1 day versus 3 days), and more reported to know their midwife (90% versus 8%). According to Rayment-Jones et al. having midwife care opposed to standard maternity care increased the likelihood of laboring women to use water for pain relief by 22%.

At the conclusion of the study Rayment-Jones et al. was able to draw the conclusion that having midwifery care opposed to standard maternity care did increase the likelihood of pregnant women choosing to labor and or birth in water (2015)! Only 11 participants (10%) out of the 96 who were receiving standard maternity care decided to labor and or birth in water whereas 34 (32%) of the 98 participants who received midwifery care made that decision. It can be concluded from the supporting evidence that the inclusion of care from a midwife or other birthing specialist does increase the likelihood of the decision to birth in water (Rayment-Jones et al., 2015).

Study two

A second study completed by Butler et al. (2015) was conducted to evaluate midwife-led care (MLC) antenatal care compared with antenatal care provided in traditional obstetric-led

hospital antenatal clinics. This study included 300 women who had low-risk pregnancy and either attended midwife led care or standard usual pregnancy clinics. Conclusion and evaluation was determined based off of postal survey, focus group and in-depth interviews from the women who participated in the study (Butler et al., 2015).

Two options of care were offered to pregnant women, midwife-led care and traditional obstetric-led care. Midwife-led care models included the midwife as being the lead professional of care of women during pregnancy and birth (Butler et al., 2015). Levels of uncertainty held by pregnant women about midwife-led care was reduced based off the findings that midwife-led care is “as safe as obstetrician-led care for women with normal pregnancy and birth, and can provide additional benefits” (Butler et al., 2015, p. 419). Participants were asked about their decision to attend the type of clinic they chose and Butler (2015) found that the top answers included having shorter waiting times, more recommendations from friends or family, having more time with the provider for discussion, and based off previous experiences of the clinic itself.

Women who chose a midwife over standard pregnancy care answered on the reasons why they made their decision:

- “Just I suppose I think I had heard it was a lot more personal, it is not... pregnancy isn't an illness as such so it seemed less of a medical route to take, it was just checking that everything was in order but not feeling that you needed to have a doctor to do it”.

(Interview, Woman5)

- “The more natural approach and the one-to-one and also the fact that you would be dealing with a midwife rather than a nurse, somebody who had a lot of experience in the area rather than just an area nurse or that kind of thing.”(Interview, Woman6)
- “Ease of not having to take half a day off work to go into the hospital and just I thought I would get better care from midwives. My feeling would be they know the job better than the doctors” (Interview, Woman7)

At the conclusion of this study Butler et al. (2015) revealed improved outcomes from midwife-led care. Decreased waiting times, having more time for discussion, convenience of access, the emphasis on natural birth, more personal package of care, and the care environment were all factors of improved outcomes and patient satisfaction (Butler et al., 2015). The use of midwife care led to the improved access of choices available to in turn increasing the emphasis on natural birth and an increase in the likelihood of women to choose water birthing as a birthing alternative (Butler et al., 2015).

Limitations

Study Design

The findings of this thesis should be considered in light of its limitations. Study design was the first detected limitation. Study designs that included non-randomized trials provided an overall limitation. For example, the design of the study completed by Rayment, Murrels and Sandalls (2015) included a non-randomized trial. Baseline demographics of the participants of the study was discovered, however the risk of residual confounding factors influencing the study was unknown. This caused uncertainty in the other influences of women’s choice of birthplace, personal wishes, and culture and philosophy about birth. Personal factors determining decisions

of birthplace and birthing methods that were unknown provide a large study limitation and the inability to factor out reasoning of choice.

Geographic Information

Another study limitation this thesis came across was the lack of information on geographics. After attempted research on the geographic the researcher was unable to locate any pertinent information on the impact of geographics and a woman's decision to give birth in water opposed to birthing on land. This limitation didn't allow the researcher to determine whether or not geographic location influenced the decision to birth in water or on land, thus reducing the amount of supporting research where the conclusion that water birthing should be practiced more is drawn from. This limitation disabled the researcher from answering the question whether or not certain areas more likely to be given the opportunity to birth in water and why.

Sample Size

A third limitation included the sample sizes of the pertinent studies used in this thesis. Small scale projects that only included a few participants' means those findings from those studies cannot be generalizable to the larger population of all birthing women. These small scale participant sizes however can be used to gain further understanding of women's specific experiences, making these studies important nonetheless. The study completed by women's experiences through labor and birth included only a sample size of 5 participants but was proven that through extensive clinical experiences that the finds are still credible.

Labor Complications

Unforeseen labor complications proved to be a limitation to this research. Many women who decided on water birthing as their form of labor and delivery came across labor complications that made their wishes unattainable. For example, a woman who chose to labor and deliver in water experienced issues such as variable decelerations that no longer allowed them to birth in water because of the risk to the already stressed fetus. Changes in decisions have also proven to be provider driven. Decisions made by the mother have been altered due to provider wishes and recommendations, thus skewing data when discovering the amount of women who labored and birthed in water. These unforeseen complications lowered the percentage of women who decided to labor and give birth in water and those who actually went through with it.

Areas for Future Research

Given that midwives as well as obstetricians have the ability to assist in all births of women who have low risk pregnancies, it is vital that both of these professionals are trained and experienced in water birthing. Future research needs to focus on ensuring that professionals assisting in labor and delivery have adequate procedures in place in the event that an unforeseen event occurs.

Geographics should be an area for future research to determine why, if true, is water birthing practiced more in certain areas of the world and certain geographic locations. This will answer the question why women choose to birth in water opposed to on land or vice versa. Identifying what areas in the country are using water birthing can provide researchers with information on how they found it to be less consequential, why are they using it more and to answer the initial question, is the decision to labor and deliver in water influenced by geographics?

Another area of future research should focus on education and whether or not women need more education so they are better equipped to make decisions regarding their birth. Many women who made the decision to labor and deliver in water were those women who had a midwife who encouraged other birthing options than vaginal delivery on land (Rayment, Murrels & Sandalls, 2015).

Greater sample sizes are needed in this area of research. Many article limitations included very small sample sizes. Although many articles started with a larger sample size, because of unforeseen circumstances, women dropping out of the study, women leaving the area of birth previously picked, or many other reasons the sample size decrease dramatically. Smaller sample sizes limit the generalizability of information for pregnant women as well as limiting the research. Future research can focus on increasing sample sizes and increasing credibility and generalizability of information.

A final area of future research needs to focus on the mother's parity details and the length of immersion during water-birth. There were many discrepancies in the research between the risk of perineal trauma during water-birthing and all articles failed to include the length of immersion. The length of immersion affects perineal outcomes because a short length immersion may increase risk of trauma due to increased elasticity thus reducing the time for stretching. A longer immersion may conclude in a decrease in perineal trauma due to enough time for perineal stretching. More research is needed on the length of immersion and its effects on perineal integrity.

Conclusion

There are several nursing implications that can be concluded from this extensive evidenced based research analysis. Diorgu et al. (2016) discovered that 106 out of 110 women said they

would choose to try another birthing position than lithotomy if given the education and choice! This being said information in prenatal education programs need to include the different laboring positions, risks and benefits of each position, as well as the physical conditioning preparation of each position. Most importantly laboring women need to be given the choice after assessing the laboring women's knowledge regarding positioning prior to the second stage of labor.

In conclusion, after extensive evidence based research it was concluded that water birthing is a safe alternative labor and birth option for women when compared to vaginal deliveries. The risks of water birthing have been disproven or are evidenced to having less risks than a vaginal delivery. Several studies conducted proved the benefits for newborns include, ease of transition into extra uterine life thus reducing the need and therefore side effects of any needed pharmaceutical analgesia reduced use of epidural analgesia, reducing the risk for side effects for the mother. Research exposed the high levels of willingness to change, adapt practice and consider trying other birthing positions but because of lack of information and provider encouragement have not had the opportunity to do so (Diorgu et al., 2016). With the adoption of other birthing options rather than standard lithotomy position there may be fewer episiotomies performed thus a reduction in the risk of maternal infection and a possible increased frequency of water-birthing.

Appendix A

Table A1

Logistic regression model for primary outcome of no/minor perineal trauma compared to major perineal trauma and influencing variables.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<i>Birth position</i>		
Waterbirth	1.0	1.0
All fours/kneeling	1.07 (0.91–1.25)	1.15 (0.97–1.35)
Semi-recumbent	1.03 (0.84–1.27)	1.08 (0.88–1.33)
Lateral	1.03 (0.80–1.35)	1.04 (0.8–1.37)
Standing	0.92 (0.73–1.16)	0.96 (0.76–1.23)
Birth stool	1.55 (1.25–1.91)	1.40 (1.12–1.75) ^a
Squatting	1.35 (0.99–1.86)	1.23 (0.89–1.71)
<i>Birth weight</i>		
< 4,000 GM	1.0	1.0
≥ 4,000 GM	1.26 (1.10–1.44)	1.48 (1.28–1.70) ^a
<i>Parity</i>		
Multiparous	1.0	1.0
Primiparous	2.06 (1.86–2.29)	2.08 (1.86–2.33) ^a
<i>Second stage</i>		
< 120 mins	1.0	1.0
≥ 120 mins	1.01 (1.01–1.01)	1.31 (1.05–1.65) ^a
<i>Accoucheur</i>		
Midwife	1.0	1.0
Obstetrician	1.80 (1.51–2.14)	1.84 (1.54–2.21) ^a

^a Significant difference.

Table A2

Logistic regression model for primary outcome of PPH compared to no PPH and influencing variables.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<i>Birth position</i>		
Waterbirth	1.0	1.0
All fours/kneeling	1.26 (0.95–1.68)	1.30 (0.97–1.74)
Semi-recumbent	1.24 (0.87–1.77)	1.16 (0.80–1.68)
Lateral	1.19 (0.75–1.90)	1.07 (0.67–1.73)
Standing	1.18 (0.78–1.78)	1.23 (0.81–1.86)
Birth stool	2.37 (1.69–3.32)	2.04 (1.44–2.90) ^a
Squatting	1.79 (1.10–2.93)	1.57 (0.95–2.62)
<i>Birth weight</i>		
< 4,000 GM	1.0	1.0
≥ 4,000 GM	1.58 (1.29–1.93)	1.80 (1.46–2.22) ^a
<i>Parity</i>		
Multiparous	1.0	1.0
Primiparous	1.82 (1.54–2.15)	1.60 (1.32–1.93) ^a
<i>Second stage</i>		
< 120 mins	1.0	1.0
≥ 120 mins	2.38 (1.82–3.11)	1.68 (1.25–2.26) ^a
<i>Accoucheur</i>		
Midwives	1.0	1.0
Obstetricians	1.15 (0.87–1.51)	1.12 (0.84–1.49)
<i>Perineal trauma</i>		
No/Minor	1.0	1.0
Major	1.70 (1.44–2.02)	1.51 (1.27–1.81) ^a

^a Significant difference.

Table A3

Logistic regression model for primary outcome of Apgar ≤ 7 at 5 mins compared to Apgar > 7 at 5 mins and influencing variables.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<i>Birth position</i>		
Waterbirth	1.0	1.0
All fours/kneeling	3.0 (0.92–9.81)	3.22 (0.98–10.57)
Semi-recumbent	4.93 (1.40–17.35)	4.61 (1.29–16.52) ^a
Lateral	3.43 (0.76–15.40)	3.31 (0.73–14.93)
Standing	3.61 (0.90–14.49)	3.70 (0.92–14.91)
Birth stool	2.35 (0.56–9.89)	2.04 (0.48–8.63)
Squatting	1.41 (0.46–13.68)	1.58 (0.95–2.63)
<i>Birth weight</i>		
< 4,000 GM	1.0	1.0
≥ 4,000 GM	1.87 (1.08–3.24)	2.10 (1.18–3.74) ^a
<i>Parity</i>		
Multiparous	1.0	1.0
Primiparous	1.96 (1.19–3.22)	2.06 (1.19–3.57) ^a
<i>Second stage</i>		
< 120 mins	1.0	1.0
≥ 120 mins	2.52 (1.24–5.15)	1.75 (0.81–3.79)
<i>Accoucheur</i>		
Midwife	1.0	1.0
Obstetrician	2.27 (1.20–4.27)	1.96 (1.01–3.80) ^a

^a Significant difference.

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