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The Benefits of Hydrotherapy During Labor

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Abstract

Background: There are many holistic options available to help women cope with the discomforts of labor including pain and anxiety. The use of hydrotherapy during labor is supported by The American College of Nurse-Midwives (2014) due to its many benefits including providing alternative pain relief measures to women during their labor and actual birth (Harper, 2014).

Purpose: The purpose of this critical review of the literature is to identify and analyze the benefits of the use of hydrotherapy during labor including the use of showers, water immersion (immersion to the nipple line) and regular bathtubs.

Results: Nineteen articles were selected for review and were appraised using the Johns Hopkins Research Evidence Appraisal Tool (Dearholt & Dang, 2012). The major findings of the review of the literature include that the use of hydrotherapy can contribute to a decrease in pain, anxiety, cesarean birth, analgesia, and epidurals as well as the augmentation of labor. In addition the literature reported that hydrotherapy can cause an increase in relaxation, normalization of birth and shorten the first stage of labor.

Conclusions: Hydrotherapy should be discussed with patients during pregnancy and offered to women during labor. Hydrotherapy is a low cost option that promotes positive outcomes for mothers and babies.

Implications for Research and Practice: Although there is room for further research on the benefits of the use of hydrotherapy during labor, there is enough current research to include hydrotherapy as a beneficial coping option during labor. The findings of this review support providing education and offering hydrotherapy to women during labor.

Keywords: hydrotherapy, water immersion

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Chapter I: Introduction

A laboring mother moves back and forth slowly in the water as she seems to be in a world of her own. Her support person sits quietly next to the tub offering quiet support as flameless candles flicker and the smell of lavender lingers in the air. A relaxing, peaceful place has been created, a space that nourishes and protects this mother as she labors and moves toward the birth of her child.

Labor and birth can be a stressful and emotional time for women and there are many options to help relieve pain, reduce anxiety and assist with coping. Some pharmacological options include intravenous pain medications, nitrous oxide and epidurals. Other more holistic options for coping with labor include aromatherapy, breathing and relaxation techniques, massage, position changes and hydrotherapy. Hydrotherapy has historically been used by women during labor and water births have also provided alternative relief measures to woman during their actual birth (Harper, 2014). The definition of hydrotherapy during labor includes the use of showers, water immersion (immersion to the nipple line) and regular bathtubs.

Statement of Purpose

St. Francis Regional Medical Center in Shakopee MN began offering water births in the fall of 2011. Since the beginning of this program many women have given birth in water and some have chosen to leave the tub and give birth on the bed or squatting. Nurses have noted that women who have left the tub have expressed that they experienced relaxation while in the tub and an increase in coping with the discomforts of labor. This feedback raised questions about the benefits of the use of water to promote relaxation and decrease pain as well as other possible unknown benefits. Questions were also raised about offering the use of the water birth tub to all patients during their labor, not just the patients who wanted a water birth. Through this process

of exploration the follow practice question emerged: "What are the benefits of using hydrotherapy during labor?"

Evidence Demonstrating Need for Critical Review

Birth should be supported as a normal physiological process. However, this process innately comes with discomfort. Women are more likely to use healthy strategies for coping with this discomfort when guided by their caregivers (Lee, 2013). According to Kennedy, Grant, Walton, Show-Battista and Sandall (2010) women should be trusted to make informed decisions and supported in their choices. They also state that birth should be supported as a normal process. The use of hydrotherapy helps support a normal birth process by allowing women to relax and better cope with the discomforts of labor. Lack of knowledge of providers including physicians, nursing and nurse-midwives, in regards to the benefits of hydrotherapy, decreases the options available to patients (Kennedy et al., 2010). Safety concerns from nursing staff can also be a barrier to the use of hydrotherapy (Stark & Miller, 2009). Providers need to understand that hydrotherapy can assist with optimal positioning of the fetus via maternal movement in the tub and therefore decrease the risk of a cesarean birth (Cluett, Nikodem, McCandlish & Burns, 2004). In addition hydrotherapy during labor has also demonstrated a decrease in pain during labor (da Silva, de Oliveira & Nobre, 2009). A woman's birth experience is an important part of her life and the use of hydrotherapy has the power to offer women a more positive overall birth experience (Lee, Liu, Lu & Gau, 2013).

Significance to Nurse-Midwifery

Nurse-midwives have the ability to educate patients on options that can help to decrease anxiety and pain during labor. By educating patients during their pregnancy about choices to assist with coping during labor, patients can be prepared with options to choose from as needed.

This process helps to empower women to make choices for themselves during labor as they select from a variety of coping strategies that have been presented to them. Hydrotherapy has the potential to improve patient outcomes, including maternal satisfaction with her birth experience (Cluett, Pickering, Getliffe, & Saunders, 2004).

The American Congress of Obstetricians and Gynecologists (ACOG) supports the use of water immersion during the first stage of labor due to the potential it has to decrease pain, the use of anesthesia and the length of labor (ACOG, 2014). The American College of Nurse-Midwives (ACNM) supports the use of hydrotherapy during labor to increase comfort and relaxation, decrease pain and promote physiologic childbirth (ACNM, 2014). In addition the Cochrane review on water immersion during labor revealed that water immersion in the first stage of labor decreases the use of epidurals and the length of labor with no adverse effects to neonatal wellbeing or increase in operative births (Cluett & Burns, 2009).

Education is lacking in the midwifery community about the benefits of hydrotherapy. In a study done by Muoz-Selles, Valles-Segales and Gobera-Tricas (2013) nurse-midwives who were trained in complementary therapies, such as hydrotherapy, were more often using hydrotherapy compared to nurse-midwives who lacked training. The lack of understanding from nursing staff can also be a barrier to the use of hydrotherapy (Stark, & Miller, 2009). By informing and educating nurses and nurse-midwives patients can be offered interventions to assist them during labor and encourage optimal outcomes.

Theoretical Framework

Callista Roy's Theory of Adaptation is a grand theory built on the belief that a person is an adaptive system that is constantly changing as it interacts with stimuli from the environment (Serçekuş & Mete, 2010). These stimuli consist of focal, contextual and residual stimuli.

Adaptation is viewed through responses to stimuli in the physiological, self-concept, role-function and interdependence modes (Serçekuş & Mete, 2010). During the process of labor women are constantly adapting within all of these modes. The physiologic mode keeps women physiologically stable during labor and birth. Physiologic stability of the mother is important during labor because it also affects the physiologic stability of the baby. The self-concept identity mode includes psychological and spiritual integrity and allows women to make meaning out of their experiences. This is an important mode since a woman's birth experience forms how she feels about herself as a woman and a mother. The role mode empowers women to make choices about their birth and the interdependence mode encourages women to work closely with their care provider and others for support, encouragement and guidance. The use of hydrotherapy during labor allows women to make choices that empower them during the labor process.

Individuals have an innate ability to adapt to their environment and are constantly changing as they interact with the environment. Women adapt during labor as they receive stimuli from the environment. Hydrotherapy has the potential to assist women with positive adaptation during labor by allowing a more positive adaptation to self-concept by empowering women, keeping them as the main focus of their birth and offering them support through caregivers and loved ones.

Summary

Nurse-midwives have the responsibility to be informed of the many benefits that hydrotherapy can offer women during labor. Educating women and suggesting ways of coping during labor benefits mothers and babies and empowers women to take control of their own labor and birth experience. The use of Roy's Theory of Adaptation helps to guide the practice of

providers as they offer emotional and physical support to women during labor that helps to promote the balancing and adaptation of the mind, body and spirit during the labor process.

Chapter II: Methods

This chapter discusses the search methods used to obtain articles to help answer the research question: "What are the benefits of using hydrotherapy during labor?" A total of 19 articles were included in the review.

Search Strategies Used to Identify Research Studies

The search for literature on the use of hydrotherapy during labor included the Bethel University library and the Allina Health library via the use of PubMed and CINAHL search engines as well as UpToDate and Google Scholar. Single search words and a combination of search words were used including: *hydrotherapy, labor, water, pain, anxiety, coping, comfort, holistic, immersion, birth* and *pain control during labor*. Research articles were also gathered from the reference lists of articles found during the search process.

Inclusion and Exclusion Criteria

Although there were a number of articles prior to 2001 on hydrotherapy, the inclusion criteria for this review focused on research articles from 2001-2015. Articles that were included focused on the use of hydrotherapy during labor. Research that only focused on birth in water was excluded from the sampling of articles to maintain focus on the use of hydrotherapy during labor alone. Articles were selected from scholarly sources only, articles that did not meet this criteria were omitted.

Number and Type of Studies

The review of the literature reported 19 research articles related to the use of hydrotherapy during labor that met the inclusion and exclusion criteria. A number of different

research methods were identified through the review of the literature and consisted of one interpretive qualitative study, one prospective cohort study, one quasi experimental study, one pilot study, one case study, one descriptive cross-sectional quantitative study, one retrospective descriptive survey study, one comparative survey study, one descriptive observational study, one interpretive study, one prospective observational study, six randomized controlled studies and two reviews of randomized controlled studies.

Criteria for Evaluating Research Studies

The Johns Hopkins Research Evidence Appraisal Tool was used to evaluate each of the articles selected (Dearholt & Dang, 2012). Through this process the strength and overall quality of the research was determined for each article. Each article was individually assessed and rated as a level I, II, III, IV or V. Level I evidence consists of an experimental study, randomized controlled trial or a systematic review of randomized controlled trials with or without meta-analysis. A level II evidence consists of quasi-experimental studies, systematic review of a combination of randomized controlled trials and quasi-experimental, or quasi-excremental studies only with or without meta-analysis. A level III consists of non-experimental studies, systematic review of a combination of randomized controlled trials, quasi-experimental and non-experimental studies or non-experimental studies only with or without meta-analysis and qualitative study or systematic review with or without a meta-synthesis. Level IV evidence consists of an opinion of respected authorities and/or nationally recognized expert committee or consensus panels based on scientific evidence and Level V consists of evidence obtained from literature reviews, quality improvement, program evaluation, financial evaluation or case reports.

Quality guidelines ranged from high, good and low (Dearholt & Dang, 2012). High quality includes consistent generalizable results with a sufficient sample size for the study and

design. This also includes adequate controls, definitive conclusions and recommendations based on literature reviews that include thorough reference to scientific evidence. Good quality includes reasonably consistent results, sufficient sample size for study and some control. It also consists of fairly definitive conclusions and reasonably consistent recommendations based on a fairly comprehensive literature review that include some reference to scientific evidence. Low quality studies have major flaws including little evidence, inconsistent results and insufficient sample size and conclusions cannot be drawn.

The 19 articles reviewed consisted of seven level I studies, five level II studies, and seven level III studies. Two studies were high quality and the remaining 17 studies were considered good quality.

Summary

The Bethel University library and the Allina Health library were used to conduct this search. Upon obtaining the articles inclusion and exclusion criteria was used to select the best articles for the review of the literature on the use of hydrotherapy during labor. After evaluating each article that was found 19 articles met the criteria for final review and evaluation. Articles were then analyzed using the Johns Hopkins Research Evidence Appraisal Tool to identify the quality and strength of each chosen article.

Chapter III: Literature Review and Analysis

Chapter three synthesizes the major findings of the literature as it pertains to the use of hydrotherapy during labor. The major findings of the reviewed literature on the use of hydrotherapy during labor reveal that hydrotherapy can decrease anxiety and pain, increase relaxation, normalize the birth experience, decrease cesarean birth rates, epidurals and the first stage of labor, contribute to a healing environment, promote movement and offer a holistic approach to birth. Barriers to the use of hydrotherapy were also found in the literature and will be discussed. Conflicting research on the use of hydrotherapy will also be reviewed followed by strengths and weaknesses of the current available research on the use of hydrotherapy during labor.

The Matrix

The matrix includes one interpretive qualitative study, one prospective cohort study, one quasi experimental study, one pilot study, one case study, one descriptive cross-sectional quantitative study, one retrospective descriptive survey study, one comparative survey study, one descriptive observational study, one interpretive study, one prospective observational study, six randomized controlled studies and two reviews of randomized controlled studies. Each article was reviewed and the purpose, sample, design, measurement, results/conclusions, recommendations and level and quality were determined and documented on the matrix. In addition the citation of each article was included using APA format. Articles represented research in the United States, England, Scotland, Northern Ireland, Australia, New Zealand and

Sweden and ranged in size from a case study with one participant to a prospective cohort study of 16,577 women. The matrix is included in the appendix A.

Major Findings

Decrease Anxiety and Pain and Increase Relaxation

The majority of the findings within the research revealed that hydrotherapy offers positive benefits for laboring women including decreasing pain and anxiety and promoting relaxation. One study found that anxiety and pain were decreased when women were assessed after being immersed in the water for 15 and 60 minutes compared to the group that was not immersed in water (Benfield, Herman, Katz, Wilson, & Davis, 2001). In another study conducted by da Silva et al.(2009) pain scores, using an observer-scored behavioral pain scale of zero to four and a self-reported numeric scale of zero to ten, were shown to decrease where women entered a tub at 6-7 cm dilation and were reassessed one hour later for pain. There was a significant difference between the experimental group and the control group ($p<0.001$) for the behavioral pain score as well as the self-reported score ($p<0.05$). In addition, Lee et al. (2013) found that women who used hydrotherapy, specifically the shower, had more pain reduction than women who did not use a shower. Campbell (2004) conducted a case study that followed a patient through her birth. This patient reported relaxation and pain relief from being in water as well as a decrease in her anxiety (Campbell, 2004).

Other studies have shown that, in addition to a reduction in pain, water immersion also reduces the use of analgesia (Cluett et al., 2004). According to the Cochrane review by Cluett and Burns (2009) women who used hydrotherapy had a significant reduction in the rate of epidurals, spinals and paracervical analgesia. In contrast, Benfield, Hortobágyi, Tanner,

Swanson, Heitkemper and Newton (2010) found that, while hydrotherapy helped to decrease maternal anxiety, it did not lead to a significant decrease in maternal pain or cortisol levels.

Decrease Cesarean Birth and Labor Augmentation

In a study conducted by Lukasse, Rowe, Townend, Knight and Hollowell (2014) patients who had water immersion for pain relief had a lower rate of transfer to a higher level of care, a lower risk of cesarean birth, and a higher chance of a normal vaginal birth with fewer interventions such as epidurals and augmentation with oxytocin compared to women who didn't use hydrotherapy. A quasi-experimental study conducted by Liu et al. (2014) also noted lower cesarean rates in women who used hydrotherapy during labor. The cesarean section rate was 32.9% in the control group compared to 13.2 % ($p=0.026$) in the group who received water immersion during labor (Liu et al., 2014). In addition to lowering pain in laboring women and reducing the risk for a cesarean birth, this study also showed that the use of hydrotherapy during labor decreased the incidence of stress urinary incontinence at 42 days after delivery with the control group at 25.5% compared to 6.1% in the experimental group, $p=0.035$ (Liu et al., 2014).

In yet another study by Cluett et al. (2004), delaying augmentation of labor and using water immersion for labor dystocia reduced epidural use (47% vs 66%, relative risk 0.71) without increasing the length of labor and rate of cesarean births. The Cochrane review on hydrotherapy during labor by Cluett and Burns (2009) also found that the use of hydrotherapy decreased the length of the first stage of labor (MD:-32.4 minutes, 95% CI, -58.67 minutes to -6.13 minutes) compared to women who did not use hydrotherapy.

Normalize Birth Experience

Hydrotherapy has the power to influence a woman's birth experience. Hydrotherapy has been shown to help "normalize" a woman's birth experience by being an effective coping strategy for them during labor (Kennedy et al., 2010). Women in a study done by Lee et al. (2013) reported a more positive birth experience when they used hydrotherapy during labor than the control group. In addition, another study showed that nulliparas had a high rate of spontaneous and normal birth when they used hydrotherapy during the first stage of labor (Burns, Boulton, Cluett, Cornelius & Smith, 2012). In a case study conducted by Campbell (2004) the participant used hydrotherapy during her first stage of labor and then reflected on her feelings and thoughts about her experience. This study concluded that the use of hydrotherapy during labor allows a woman to have a sense of control and empowerment over her birth experience (Campbell, 2004).

Holistic Approach and Promotion of Healing Environment

There are numerous coping strategies that can be used during labor. Brown, Douglas and Flood (2001) found that, when reviewing ten alternative coping strategies, including hydrotherapy, some techniques worked well for some women and not as well for other women. However, no one technique worked equally effectively for all women. They found that hydrotherapy and aromatherapy were used the most infrequently compared to the other eight interventions studied. Hydrotherapy has also been shown to increase maternal movement including rhythmic positions within the tub (Stark, Rudell & Haus, 2008). These natural movements have the potential to assist the fetus into an optimal position for birth.

Hydrotherapy contributes to a healing environment during labor. In a study by Maude and Foureur (2007) five women were interviewed after their use of hydrotherapy during their labor. An interpretive inquiry using storytelling and thematic analysis was used to understand

the meaning of the experiences that the woman had during their labor. Women in the study stated that being in water helped them to cope with labor and created a safe, protective barrier that offered them a sense of privacy. Participants also stated that the use of hydrotherapy decreased their pain and fear and they felt cradled and supported (Maude & Foureur, 2007).

Barriers to Use of Hydrotherapy

In assessing the use of complementary therapies, including hydrotherapy, by 237 nurse-midwives, Muñoz-Sellés et al. (2013) found that midwives who had training in complementary therapies considered relaxation techniques, hydrotherapy and compresses to the perineum to be quite or very useful for pain relief during labor. They stressed the importance of midwifery education to include integrative therapies like hydrotherapy. Stark and Miller (2009) found that lack of nursing education contributed to the lack of use of hydrotherapy. Stark and Miller (2009) noted that nurses' personal concerns about safety, lack of understanding about safety and lack of understanding about the effectiveness of hydrotherapy were barriers to its use. Education on the use of fetal monitoring in the tub also needs to be included in nursing education. Intermittent auscultation as well as cordless, waterproof telemetry monitoring if continuous monitoring is indicated, must also be readily available for use in labor and delivery units. Nurses should also be educated that rupture of membranes is not a contraindication for hydrotherapy during labor (Harper, 2005).

Conflicting Research

In contrast to the positive benefits found in the majority of the articles reviewed, Eckert, Turnbull, and MacLennan (2001) found no differences in the amount of pharmacological analgesia used in women who used hydrotherapy compared to a control group. They also found that newborns of mothers who used hydrotherapy had more resuscitations than those in the

control group. In addition, this study revealed that women who didn't have hydrotherapy rated their overall experience of childbirth more positively than women who did use hydrotherapy. However, Ohlsson et al. (2001) found no significant difference in the number of newborns with an Apgar of less than 7 at five minutes, neonatal distress or tachypnea when women used hydrotherapy during their labor compared to women who didn't use hydrotherapy. Cluett and Burns (2009) also found no differences in Apgar scores, neonatal unit admissions or neonatal infections.

Strengths and Weaknesses

The quality of the evidence reviewed was overall rated as good with two research studies being of high quality based on the John Hopkins Research Appraisal Tool. Strengths included six randomized controlled studies and the majority of the studies reviewed had large sample sizes. The purpose, sample, design, measurements, results/conclusions and recommendations were all easily extracted from all of the articles included within the matrix.

Limitations of the existing research on hydrotherapy include small sample sizes in some studies as well as no control groups and lack of randomization in other studies. Much of the research also lacked clear descriptions of hydrotherapy which can include showers, water immersion (immersion to the nipple line) or the use of regular bathtubs. None of the studies specified different cultural groups and ages of participants were not included in the majority of the studies reviewed. Limitations also exist due to the lack of current research in this area.

Summary

The matrix consists of 19 research studies that assessed the use of hydrotherapy during labor. Through the use of the Johns Hopkins Research Appraisal Tool each article was assessed and reviewed and a quality and evidence level were then assigned. A good quality rating was given to 17 of the article and a high quality rating was given to two of them. The evidence

revealed that hydrotherapy can be a therapeutic option for women during labor and has the power to decrease anxiety and pain, promote relaxation, decrease risk of cesarean birth, decrease the use of analgesia and epidurals, shorten the first stage of labor, decrease labor augmentation in first time mothers, promote the normalization of birth, encourage maternal movement, provide a safe and protective environment for women and increase maternal satisfaction with the birth experience.

Chapter IV: Discussion, Implications and Conclusions

Synthesis of the Literature to Answer the Practice Question

The original research question of interest was: *What are the benefits of using hydrotherapy during labor?* The Johns Hopkins Research Evidence Appraisal Tool was used to review 19 qualifying articles on this topic. The findings were then synthesized to evaluate trends and gaps in the literature and identify implications for nurse-midwives as well as future research needs. Callista Roy's Theory of Adaptation was applied to the use of hydrotherapy during labor to assist with overall adaptation during the labor process through responses in the physiological self-concept, role-function and interdependence modes of adaptation.

Implications for Nurse-Midwifery Practice

This critical appraisal of the literature has many implications for nurse-midwives. Although there is room for further studies on the use of hydrotherapy, there is enough current evidence to promote the use of hydrotherapy during labor. The findings of this review should prompt nurse-midwives to encourage the use of hydrotherapy for their patients to help decrease anxiety and pain, promote relaxation and the normalization of birth, decrease cesarean rates, shorten the first stage of labor, decrease the use of analgesia and epidurals and create a holistic healing environment during labor. Nurse-midwives have the ability to discuss and encourage the

use of hydrotherapy as an option with patients and thereby promote positive outcomes for patients and their babies.

When patients are experiencing pain and anxiety during labor, nurse-midwives should suggest the use of hydrotherapy as a natural option to help with coping and decrease discomfort. Nurse-midwives should also inform their patients that the use of hydrotherapy can help to decrease their risk of a cesarean birth as well as shorten the first stage of labor. In addition, when nurse-midwives are considering augmentation of labor, hydrotherapy should be offered to a patient as a natural option to promote labor. Nurse-midwives should also explain the research on hydrotherapy including a decrease in epidural rates to help promote its use.

The findings in the literature also encourage nurse-midwives to seek further training in complementary approaches and comfort options that can be used during labor (Muñoz-Sellés et al., 2013). In addition, the literature supports the importance of educating nurses caring for patients during labor to decrease anxiety and concerns about the use of hydrotherapy (Stark & Miller, 2009). Nurse-midwives are in a perfect position to educate nurses and other providers on the many benefits of the use of hydrotherapy and also address any concerns that nurses might have about the use of hydrotherapy. Through this type of collaboration and education, women can be offered a variety of coping mechanisms to assist them throughout their labor, including the use of hydrotherapy.

Options to assist with coping during labor, including the use of hydrotherapy, should be discussed with patients during their pregnancy as well as during labor to help increase coping and the promotion of positive outcomes including decreasing the risk for a cesarean birth, decreasing labor augmentation, decreasing pain and anxiety, shortening the first stage of labor and increasing relaxation and normal birth. Nurse-midwives are in a unique position to discuss

and offer hydrotherapy to their patients as a holistic approach to coping with labor. Hydrotherapy can also help decrease the use of epidurals, spinals and paracervical analgesia (Cluett and Burns, 2009) so women are able to move more during their labor and allow their baby to get into an optimal position for birth. In addition nurse-midwives can offer hydrotherapy to patients to help with labor dystocia and therefore avoid augmentation when not necessary. This process helps to promote a natural physiologic birth.

Women remember their birth experience the rest of their lives, and it forms how they feel about themselves as women and mothers. The literature states that the use of hydrotherapy during labor can help "normalize" a woman's birth experience and offer women a more positive birth experience (Kennedy et al., 2010). Nurse-midwives should assist women to obtain a positive birth experience.

A nurse-midwives seeks to create a sense of privacy and safety for patients during their labor experience and hydrotherapy can assist in creating this type of a healing environment (Maude & Foureur, 2007). When women are comfortable and feel safe their stress hormones will decrease and their labor will progress. Hydrotherapy has the power to assist with this process.

Nurse-midwives should also use the evidence from the literature to advocate for birthing tubs to be in all labor rooms in hospital and birth centers. By doing so, nurse-midwives are using available research to promote natural ways of coping during labor that have positive benefits for women and their babies.

Recommendations for Future Research

More randomized clinical trials need to be conducted with a larger number of participants to further add to the existing literature on the use of hydrotherapy in labor. Qualitative studies would also provide more evidence regarding the emotional impact that hydrotherapy might have on a woman's feelings about herself and her birth experience. Studies should be conducted with women who have already had a vaginal delivery without the use of hydrotherapy and subsequently have another vaginal delivery using hydrotherapy. This type of study would allow participants to compare and contrast their different birth experiences. Long-term studies on a woman's reflection of her childbirth experience could add additional knowledge and information about the use of hydrotherapy during labor and birth including long-term benefits that might contribute to maternal-infant bonding and the self-concept of new mothers.

Studies should also be conducted that specify using water immersion (immersion to the nipple line), showers or regular sized bathtub. These studies could hold important information that could help to promote the installation and use of large labor tubs in all laboring units as a standard of care based on research findings. Expanding this topic could also include the current availability of tubs for hydrotherapy in hospital settings. More studies on the possible decrease in cesarean rates should be conducted as well as reasons for leaving the tub during labor.

Although there are a few articles discussing barriers to the use of hydrotherapy, this area should be further explored. This includes the use of hydrotherapy with patients followed by an obstetrician compared to patients cared for by a nurse-midwife, to identify possible gaps in provider education on the use of hydrotherapy. In addition, comparing hospital culture and provider feelings on hydrotherapy could be explored. Home, hospital and freestanding birth center statistics and outcomes related to the use of hydrotherapy should also be studied.

Integration and Application of Selected Theoretical Framework

Callista Roy's Theory of Adaptation can be used as a foundation to promote hydrotherapy during labor as adaptation is viewed through responses to stimuli in the physiological, self-concept, role function and interdependence modes. Hydrotherapy can help women adapt and maintain physiological stability during labor by promoting relaxation, decreasing pain, decreasing the risk of cesarean section, shortening the first stage of labor, allowing movement during labor. The self-concept mode including psychological and spiritual integrity and allows women to make meaning out of their experience. Hydrotherapy can assist in this mode by promoting a decrease in anxiety, create a healing environment, and helping to normalize the birth experience. In addition, hydrotherapy promotes the role mode of Roy's theory by empowering women to make choices about their labor and birth. By working closely with their provider and nurses, patients adapt in the interdependence mode as they find support, encouragement and guidance during their labor. Part of this labor support includes the access and availably of hydrotherapy. Overall, hydrotherapy has the power to promote positive adaptation during the labor process and support the balance of the mind, body and spirit.

Conclusion

The major findings of the literature review on the use of hydrotherapy during labor reflect the benefits of its use to promote relaxation and movement, decrease anxiety and pain, decrease the risk of cesarean birth and use of epidurals, shorten the first stage of labor, decrease augmentation of labor, normalize the birth process and create a healing environment. Nurse-midwives have the power to educate women during their pregnancy, as well as during their labor, in regard to the many benefits of the use of hydrotherapy during labor. By doing so, nurse-midwives will help to empower women and promote positive outcomes for mothers and babies. Callista Roy's Theory of Adaptation provides the theoretical framework to assist and support

women during the labor process. The current body of knowledge on hydrotherapy during labor can be strengthened through additional research in a number of areas.

A woman moves slowly back and forth in the water during her labor. A supportive environment has been created with the use of hydrotherapy that will decrease her pain and anxiety, as well as her risk of interventions, and promote optimal outcomes for herself and her newborn.

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Lee, S., Liu, C., Lu, Y., & Gau, M. (2013). Efficacy of warm showers on labor pain and birth

experiences during the first labor stage. *JOGNN: Journal Of Obstetric, Gynecologic & Neonatal Nursing*, *42*(1), 19-28. doi:10.1111/j.1552-6909.2012.01424.x

Liu, Y., Liu, Y., Huang, X., Du, C., Peng, J., Huang, P., & Zhang, J. (2014; 2013). A comparison of maternal and neonatal outcomes between water immersion during labor and conventional labor and delivery. *BMC Pregnancy and Childbirth, 14*(1), 160-160. doi:10.1186/1471-2393-14-160

Lukasse, M., Rowe, R., Townend, J., Knight, M., & Hollowell, J. (2014). Immersion in water for pain relief and the risk of intrapartum transfer among low risk nulliparous women: Secondary analysis of the birthplace national prospective cohort study. *BMC Pregnancy and Childbirth, 14*(1), 60-60. doi:10.1186/1471-2393-14-60

Maude, R., & Foureur, M. (2007). It's beyond water: Stories of women's experience of using water for labour and birth. *Women & Birth*, *20*(1), 17-24. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17174165

Muñoz-Sellés, E., Vallès-Segalés, A., & Goberna-Tricas, J. (2013). Use of alternative and complementary therapies in labor and delivery care: A cross-sectional study of midwives' training in Catalan hospitals accredited as centers for normal birth. *BMC Complementary and Alternative Medicine,* 13(1), 318-318. doi:10.1186/1472-6882-13-318v

Ohlsson,G., Buchhave, P., Leandersson, U., Nordstrom, L., Rydhstrom, H, & Sjolin, I. (2001). Warm tub bathing during labor: Maternal and neonatal effects. *Acta Obstetricia Et Gynecologica Scandinavica, 80*(4), 311-314. doi:10.1034/j.1600-0412.2001.080004311.x

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37(1), 116-122. doi:10.1111/j.1552-6909.2007.00212.x

Appendix A: Matrix of the Literature

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Benfield, R., Herman, J., Katz, V., Wilson, S., & Davis, J. (2001). Hydrotherapy in labor. *Research in Nursing & Health, 24*(1), 57-67. doi:10.1002/1098-240X(200102)24:1<57::AID-NUR1007>3.0.CO;2-J	To assess whether hydro-therapy during labor decreases maternal anxiety and pain.	18 women (9 in each group) with term, low-risk singleton pregnancies who presented to the hospital in spontaneous labor. Study took place in a hospital in the South-eastern United States.	Randomized controlled study pilot study. Pretest-Posttest control group design with repeated measures. Patients placed in the tub at 4 cm dilation for one hour.	Pretest-posttest using the Visual Analogue Scale for Anxiety (VASA) and a pain scale from 0-100. Hgb and Hct were used to calculate plasma volume shift, an indirect measurement of uteroplacental perfusion. Done at the beginning of the study and after 15 and 60 minutes in the tub. Urine catecholamines were used as an indicator of sympathetic nervous system arousal resulting from anxiety. Done at the beginning of the study and then after one hour in the tub.	15 minutes after being in the tub and at 60 minutes being in the tub, pain and anxiety scores were decreased compared to the control group. After 15 minutes of immersion in the tub women had a significantly greater increase in plasma volume than non-bathers. No significant differences found in urine catecholamines or maternal-fetal complications between the two groups.	Findings offer preliminary support for the therapeutic effects of bathing in labor for acute, short-term anxiety and pain relief. Hydrotherapy should be considered as an alternative or supplemental intervention for patients to help decrease pain and anxiety during labor.	Level 1 Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Benfield, R., Hortobágyi, T., Tanner, C., Swanson, M., Heitkemper, M., & Newton, E. (2010). The effects of hydrotherapy on anxiety, pain, neuroendocrine responses, and contraction dynamics during labor. *Biological Research for Nursing, 12*(1), 28-36. doi:10.1177/1099800410361535	To assess the effects of hydro-therapy on anxiety, pain, neuro-endocrine responses and contraction dynamic during labor.	11 term women with a mean age of 24.5 in spontaneous labor.	Pilot study with pretest and posttest design. Women were immersed to the xiphoid in 37 degree C water for one hour.	Blood samples and measures of anxiety and pain were obtained under baseline conditions and repeated after 15 and 45 minutes of hydrotherapy. Pretest-posttest with repeated measures. VASA and VASP scales were used to measure pain and anxiety. Stress hormone levels were also drawn.	Hydrotherapy was associated with a decrease in anxiety, vasopressin and oxytocin levels at 15 and 45 minutes after being immersed in water. There was no significant differences between preimmersion and immersion pain or cortisol levels. Pain decreased more with women with high baseline pain than women with low baseline pain. Hydrotherapy during labor affects neuroendocrine responses that modify psychophysiological processes.	Hydrotherapy should be an option for laboring women to help decrease anxiety and pain, particularly in patients with high levels of pain.	Level II Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Brown, S., Douglas, C., & Flood, L. (2001). Women's evaluation of intrapartum nonpharm-acological pain relief methods used during labor. *Journal Of Perinatal Education*, *10*(3), 1-8.	To examine which nonpharm-acologic pain relief techniques laboring women use most often and the effective-ness of the chosen techniques.	Women who had attended childbirth preparation classes conducted by a Lamaze Certified Childbirth Educator who were at least 18 years old, literate in English, within 6 months postpartum. 37 primiparas and 9 multiparas in a South-eastern state in the U.S.	Retro-spective, descriptive survey design.	A survey assessing 10 common nonpharmacologic childbirth pain-management techniques including breathing and relaxation techniques, positioning/move-ment, music, touch, massage/effleurage, acupressure, hot/cold therapy, aromatherapy, guided imagery and hydrotherapy. Participants were asked if these techniques were taught and then they had to rank the techniques on how effective they were. A comment section also allowed further input from participants.	Breathing techniques, relaxation, acupressure and massage were found to be most effective. Hydrotherapy and aromatherapy were used infrequently. No one specific technique or combination of interventions helped all women, each woman had her own unique experience and preferred some techniques over others.	Nurses and childbirth educators should educate women on options available to assist with pain management during labor. Further research is needed to assess the use of techniques including breathing and relaxation techniques, positioning/move-ment, music, touch, massage/effleurage, acupressure, hot/cold therapy, aromatherapy, guided imagery and hydrotherapy and how they can contribute to better outcomes, lower cost, and higher patient satisfaction.	Level III Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Burns, E. E., Boulton, M. G., Cluett, E., Cornelius, V. R., & Smith, L. A. (2012). Characteristics, interventions, and outcomes of women who used a birthing pool: A prospective observational study. *Birth, 39*(3), 192-202. doi:10.1111/j.1523-536X.2012.00548.x	To describe and compare maternal character-istics, intrapartum events, intervene-tions, and maternal and neonatal outcomes by planned place of birth for women who used a birthing pool.	8,924 women at low risk of childbirth complica-tions were recruited from care settings in England, Scotland, and Northern Ireland.	Prospective observational study	Midwives prospectively recorded data on a standardized form while caring for a woman during labor and birth. Data included maternal characteristics, intrapartum events, maternal outcomes and neonatal outcomes. Data included age, gestation, obstetrical history, inductions, use of pharmacological/non-pharmacological analgesia, augmentation with rupture of membranes or oxytocin, length of time in the tub and reason for leaving the tub, delivery type and complications, Apgar score, neonatal weight, resuscitation, infection, NICU admission and death.	Birthing pool use was associated with a high frequency of spontaneous birth and normal birth, particularly among nulliparas. The use of interventions and outcomes in alongside midwifery units was similar to that in the obstetric units, but not the community setting and more epidurals. Nulliparas who gave birth in a community setting spent more time in the birthing pool than the patients in an obstetric unit or alongside midwifery unit. Obstetrical units had more inductions. No differences were found in multiparas or in outcomes of newborns.	Laboring in a birthing pool should be encouraged and offered to all women in all birth settings. Further studies as to why patients exit the birthing tub need to be conducted.	Level II Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Campbell, G. (2004). Critical incident analysis of water immersion. *British Journal of Midwifery*, *12*(1), 7-11. doi:10.12968/bjom.2004.12.1.11963	This study reflects on a woman's experience of using water immersion during the first stage of labor and is arranged using Gibbs' reflection cycle.	One woman who used hydro-therapy for her second birth and sub-sequently gave birth in water	Case Study	Interview with patient and researchers reflection on witnessing the patient. Researcher witnessed/observed one mother use hydrotherapy in labor and birth. Gibb's reflection cycle was used: Description of what happened-feelings/thoughts-evaluation-analysis-conclusion-action plan (would you do it again)	Reflection on witnessing this patient use hydrotherapy and birth in water reinforced the significance of providing women with an informed choice and control during labor. Patient reported relaxation and pain relief from being in water as well as a decrease in anxiety.	Laboring in water should be viewed as part of the philosophy of choice a woman has during labor. Hydrotherapy helps woman have control over their choices and facilitates the empowerment process. Additional studies with larger populations are warranted.	Level III Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusion	Recommendations	Level & Quality
Cluett, E. R., & Burns, E. (2009). Immersion in water in labor and birth. *The Cochrane Database of Systematic Reviews,* (2), CD000111.	To assess the evidence from randomized controlled trials about immersion in water during labor and waterbirth on maternal, fetal, neonatal and caregiver outcomes.	This review includes 12 trials (3243 women) eight related to just the first stage of labor: one to early versus late immersion in the first stage of labor; two to the first and second stages; and another to the second stage only.	Review of randomized controlled studies only	Assessed trial eligibility and quality and extracted data independently. One review author entered data and the other checked for accuracy.	Results for the first stage of labor showed there was a significant reduction in the rate of epidural/spinal/para-cervical analgesia/ anesthesia amongst women allocated to water immersion group compared to controls. There was also a reduction in duration of the first stage of labor There was no difference in assisted vaginal deliveries and caesarean sections use of oxytocin infusion perineal trauma or maternal infection. There were no differences for Apgar score less than seven at five minutes neonatal unit admissions or neonatal infection rates.	Water immersion can have beneficial results by decreasing the use of epidural/spinal/para-cervical analgesia/ anesthesia as well as decreasing the first stage of labor. More research is needed on the different types of tubs used for hydrotherapy. A lack of data for some comparisons prevented robust conclusions. Further research is needed.	Level I High

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Cluett, E. R., Nikodem, V. C., McCandlish, R. E., & Burns, E. E. (2004). Immersion in water in pregnancy, labour, and birth. *Birth, 31*(4), 317-317. doi:10.1111/j.0730-7659.2004.00326.x	Too assess the evidence from randomized controlled trials about the effects of immersion in water during pregnancy, labor or birth on maternal, fetal, neonatal and caregiver outcomes.	Search of the Cochrane Pregnancy and Childbirth Group trials register (9/2003). Eight trials were included with 2939 women.	Search Criteria: All randomized controlled trials comparing any kind of bath tub/pool with no immersion during pregnancy, labor or birth.	They assessed trial eligibility and quality and extracted data independently. One reviewer entered the data and another checked them for accuracy.	Water immersion during the first stage of labor reduces the use of analgesia and reported maternal pain without adverse outcomes on labor duration, operative delivery or neonatal outcomes. The effects of immersion in water during pregnancy or in the third stage of labor are unclear.	Water immersion offers an option for pain control during labor and should be available to all women as an option.	Level III High

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Cluett, E. R., Pickering, R. M., Getliffe, K., & St George Saunders, N. J. (2004). Randomized controlled trial of laboring in water compared with standard of augmentation for management of dystocia in first stage of labour. *BMJ: British Medical Journal, 328*(7435), 314-318. doi:10.1136/bmj.37963.606412.EE	To evaluate the impact of laboring in water during the first stage of labor on rates of epidural analgesia and operative delivery in nulliparous women with dystocia.	University teaching hospital in southern England inducing 99 nulliparous women with dystocia (cervical dilation rate <1/hour in active labor) with low risk of complica-tions. The study took place over a two year period of time.	Randomized controlled trial which compared immersion in water during the first stage of labor after diagnosis of labor dystocia with women who were augmented with an amniotomy and/or Pitocin. 48 women were allocated to hydrotherapy and 48 received standard augmentation	Primary outcome measures were epidural analgesia and operative delivery including vacuum, forceps and cesarean birth. Secondary measures induced augmentation rates (Pitocin, AROM or both) and maternal or neonatal morbidity. Postpartum interviews were also conducted to assess the woman's experience in regards to pain management and overall satisfaction in relationship to privacy and freedom of movement during water immersion using a four point Likert scale.	The women who labored in water compared to women given standard augmentation had no difference in operative delivery rates and tended to receive less epidural analgesia. 30% of the women who labored in water did not receive augmentation and 20% received no obstetric intervention. These rates were significantly different from the augmentation group. The women in water also reported less pain and increased satisfaction with their birth experience.	Delaying augmentation in association with a supportive environment inducing water immersion is acceptable for women with dystocia of labor and may reduce the need for an epidural without increasing the length of labor or rate of cesarean birth. Further research is indicated to assess the effects of water immersion on neonates. Water immersion may be an alternative option to early augmentation of labor.	Level I Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
da Silva, F., de Oliveira, S., & Nobre, M. (2009). A randomized controlled trial evaluating the effect of immersion bath on labour pain. *Midwifery*, *25*(3), 286-294. doi:10.1016/j.midw.2007.04.006	To evaluate the effect of immersion bath on pain magnitude during the first stage of labor.	108 women with 54 randomly assigned to each group.	Randomized controlled study comparing the pain scores of bathing and non-bathing multiparous women during birth. When patients were 6-7cm dilated they were placed in an immersion bath for 60 minutes.	Pain scores using a behavioral pain scale and a numeric scale were recorded at two evaluation time points: 6-7 cm of dilation and 1 hour after the first pain score evaluation.	The pain scores using the behavioral pain scale and the numeric scale were similar in both groups prior to immersion in water and the scores were greatly decreased in the experimental group after immersion in water compared to the control group scores which were statistically higher.	Immersion bath is a suitable alternative form of pain relief for women during labor.	Level I, Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Eckert, K., Turnbull, D., & MacLennan, A. (2001). Immersion in water in the first stage of labor: a randomized controlled trial. *Birth: Issues In Perinatal Care*, *28*(2), 84-93.	To measure the use of pharma-cological pain relief, maternal and neonatal clinical outcomes and satisfaction with care with women who used hydro-therapy compared to those who did not.	274 pregnant women, free from complica-tions, expecting a singleton and at term at the Women's and Children's Hospital in Adelaide, South Australia.	A purposive randomized controlled trial	Data collected inducted medications, maternal complications and interventions used in labor and delivery. Neonatal charts were reviewed for infant compromise, infections and the use of antibiotics. Questionnaires were given to patients at 24- 48 hours after delivery, questions A second questionnaire was mailed to patients at 8-9 months postpartum measuring the same variables and also postnatal distress. Visual analog scales, Likert scales and Edinburgh Postnatal Depression Scale.	No statistical differences between the two groups for maternal infectious morbidity, newborns in the study group received more resuscitation than those in the control group. No differences in the amounts of pharmacological analgesia used. Women who received the routine care rated their overall experience of childbirth more positively than women allocated to the bath group. No statistical difference between postnatal distress.	Bathing in labor confers no clear benefits for the laboring woman but may contribute to adverse effects in the neonate. Further research studies with larger population groups are needed to further evaluate the benefits of hydrotherapy.	Level I Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Kennedy, H., Grant, J., Walton, C., Shaw-Battista, J., & Sandall, J. (2010). Normalizing birth in England: A qualitative study. *Journal of Midwifery and Women's Health, 55*(3), 262-269. doi:10.1016/j.jmwh.2010.01.006	To examine factors that foster or hinder the support of normal birth in two English National Health Service Trusts in England identified for public recognition of their work to normalize birth.	33 maternity clinicians (26 midwives, six obstetricians and one anesthe-siologist) and 28 women who had given birth in the trust.	Interpretative qualitative study using institutional ethnographic and narrative methods.	Transcription of narrative responses to identify themes and institutional ethnography to describe social and institutional forces that organize, shape and limit women's ability to have a normal birth.	Three keys to support the normalization of birth. 1) a philosophy of the normality of birth 2) using evidence to support practice 3) trusting women to make informed choices. Barriers were technology, disregarding risk status when assigning women to units, lack of physician preparation in normal birth and not enough staff. Women were more likely to rate their birth as normal if they labored and/or birthed in water.	The results should be carefully examined for translation to the United States and further research. Goals should include decreasing cesarean births in low risk women as well as complications of labor and birth. Mothers should be trusted to make informed decisions and supported in their innate capacity to birth and yet be safeguarded in the process. Birth should be supported as a natural process.	Level III Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Lee, S., Liu, C., Lu, Y., & Gau, M. (2013). Efficacy of Warm Showers on Labor Pain and Birth Experiences During the First Labor Stage. *JOGNN: Journal Of Obstetric, Gynecologic & Neonatal Nursing*, *42*(1), 19-28. doi:10.1111/j.1552-6909.2012.01424.x	To determine the efficacy of warm showers on parturition pain and the birth experiences of women during the first stage of labor.	Maternity ward of a Taipei City, Taiwan regional teaching hospital. 80 women completed the study, 41 in the control group and 39 in the experi-mental group	Randomized controlled trial.	A 20 minutes shower, after the first five minutes of full body or lower back shower the participants could spend 15 minutes directing shower water towards any body region they wanted to. The Visual Analogue Scale for Pain (VASP) and the Labour Agentry Scale were used to assess labor pain and the birth experience.	After adjusting for demographic and obstetric data, experimental-group women who participated in warm showers reported significantly lower VASP scores at 4 cm and 7cm cervical dilations, and reported more positive birth experiences than the control group.	Warm showers are a cost-effective, convenient, easy-to-deploy, non-pharmacological approach to pain reduction during labor. This intervention helps women in labor to participate fully in the birth experience, earn continuous caregiver support, feel cared for and comforted, and have a more positive overall experience.	Level I Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Liu, Y., Liu, Y., Huang, X., Du, C., Peng, J., Huang, P., & Zhang, J. (2014). A comparison of maternal and neonatal outcomes between water immersion during labor and conventional labor and delivery. *BMC Pregnancy and Childbirth, 14*(1), 160-160. doi:10.1186/1471-2393-14-160	To compare maternal and neonatal outcomes of women who underwent water immersion during the first stage of labor with those who underwent conven-tional labor and delivery.	38 women received water immersion and 70 underwent conven-tional labor and delivery.	Women were allowed to choose if they wanted immersion in water or not so the study was not randomized. Quasi experimental	A visual analogue scale was used to assess pain during labor. Assessment scores were assessed at 30 and 60 minutes of time in the tub.	Pain was lower in the group that was immersed in water compared to the conventional group. Stress urinary incontinence at 42 days after delivery was also lower in the water immersion group as was the cesarean birth rate.	Water immersion during labor is an intrapartum service model that is worthy of promotion and application.	Level II Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Lukasse, M., Rowe, R., Townend, J., Knight, M., & Hollowell, J. (2014). Immersion in water for pain relief and the risk of intrapartum transfer among low risk nulliparous women: Secondary analysis of the birthplace national prospective cohort study. *BMC Pregnancy and Childbirth, 14*(1), 60-60. doi:10.1186/1471-2393-14-60	Investigate the association between water immersion for pain relief and transfer before birth and other maternal outcomes.	16,577 low risk nulliparous women planning a home birth, freestanding midwifery unit or an alongside midwifery unit birth in England between 2008 and 2010	A prospective cohort study	Data was recorded by the midwife attending the birth using a study-specific data collection form that was started during the labor and completed on or after the fifth postpartum day.	Water immersion for pain relief had a lower rate of transfer to a higher level of care, a lower risk of cesarean birth and a higher chance of a straightforward vaginal birth and fewer interventions such as epidurals and augmentation with oxytocin.	Immersion in water should be offered for pain relief to low risk healthy women with uncomplicated pregnancies.	Level II Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Maude, R., & Foureur, M. (2007). It's beyond water: Stories of women's experience of using water for labour and birth. *Women & Birth*, *20*(1), 17-24. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17174165	To give a 'voice' to woman's experience of using water for labor and birth.	5 women from a large urban region in New Zealand who used water for labor and birth, at home and in the hospital	An interpretive design using storytelling and thematic analysis to derive meaning of the experiences of the five women.	Used audio-taped conversation as the method of data collection and a thematic analysis of the women's stories using a Giorgi-style method of data analysis.	Data produced two core categories: 'Getting to the water' which revealed the impact of preparing for and anticipating the water and 'getting into the water' which provided a sanctuary and a release from pain. The warm water cradled, supported, relaxed, comforted, soothed, sheltered and protected the women. It created a barrier and offered a sense of privacy. Water was used to reduce pain and fear of childbirth and it was not necessary to birth in the water to achieve these results.	Hydrotherapy should be discussed with women throughout the pregnancy and at the time of labor and birth as a research based option to help women deal with the discomforts of labor. Larger studies should be conducted on the lived experience of women using hydrotherapy during their labor.	Level III Good yet small sample

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Muñoz-Sellés, E., Vallès-Segalés, A., & Goberna-Tricas, J. (2013). Use of alternative and complementary therapies (CAT) in labor and delivery care: A cross-sectional study of midwives' training in Catalan hospitals accredited as centers for normal birth. *BMC Complementary and Alternative Medicine, 13*(1), 318-318. doi:10.1186/1472-6882-13-318v	To describe the professional profile of midwives who provide care for natural childbirth in Catalan hospitals accredited as centers for normal birth, to assess midwives' level of training in Comple-mentary and alternative therapies including hydro-therapy.	455 midwives from 28 public hospitals in Catalonia.	A descriptive, cross-sectional and a quantitative method was used.	Questionnaires were given to midwives that provided personal and professional information, training in CAT and perception of the usefulness of complementary therapies. 23 areas were assessed including the use of hydrotherapy.	237 midwives responded to the questionnaire. 89.87 % of the midwives had training in complementary therapies. Of the midwives who were trained in complementary therapies considered the following to be quite or very useful for pain relief during labor and delivery: relaxation techniques, hydrotherapy and application of compresses to the perineum. 37.1 % of the midwives had training in hydrotherapy.	It is essential to increase the courses for midwives so that they can broaden their knowledge of CAT for birth and provide effective care for women. Health authorities must ensure safe intervention and good practices, incorporate CAT into courses for health care professionals and into the health system, and contribute to standardizing the effective and safe use of CAT.	Level III Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Ohlsson,G., Buchhave, P., Leandersson, U., Nordstrom, L., Rydhstrom, Hl, & Sjolin, I. (2001). Warm tub bathing during labor: Maternal and neonatal effects. *Acta Obstetricia Et Gynecologica Scandinavica, 80*(4), 311-314. doi:10.1034/j.1600-0412.2001.080004311.x	To study possible detrimental maternal and neonatal effects of immersion in warm water during labor.	1,237 participants from three obstetrical units in Ostersund, Lund and Karlskrona in Sweden.	Prospective randomized controlled bathing during first stage of labor vs not bathing in obstetrical departments at a university hospital and two central hospitals.	Rate of analgesia, instrumental delivery, cesarean section, hemorrhage, perineal tears grade III-IV, maternal stay postpartum, Apgar score at 5 min less than 7, neonatal distress, tachypnea and neonatal jaundice were tracked via patient's charts.	On average participants stayed in the tub 50-60 minutes. No significant differences were found in regards to referral rate to the NICU, for epidural analgesia, cesarean sections, perineal tears grade III-IV or maternal postpartum stay. No significant difference was seen in the number of newborns with Apgar of less than 7 at five minutes, neonatal distress or tachypnea. No negative effects were found of bathing during labor.	Expectant mothers wanting to use hydrotherapy during labor may do so without jeopardizing their own or their newborn's wellbeing after birth.	Level I Good
Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level &

							Quality
Stark, M., & Miller, M. (2009). Barriers to the use of hydrotherapy in labor. *JOGNN: Journal Of Obstetric, Gynecologic & Neonatal Nursing*, *38*(6), 667-675. doi:10.1111/j.1552-6909.2009.01065.x	To determine nurses' perceived barrier to the use of hydro-therapy in labor. Hydro-therapy is rarely used during labor yet is effective in relieving pain, reducing anxiety, encouraging relaxation and promoting a sense of control.	Intrapartum nurses attending a national convention and members of perinatal listserves were recruited. A total of 401 nurses were included in the study.	Comparative descriptive survey design.	Nurses' perception of the use of hydrotherapy was measured using a 30 item Likert scale survey with statements regarding barriers that might be encountered in providing hydrotherapy during labor. Higher scores indicated greater perception of barriers.	"Personal concerns" including physical discomforts, risk of injury and unexpected problems that might be encountered while caring for a patient having hydrotherapy were the greatest barrier with "Knowledge & Beliefs" having the lowest mean. Lack of understanding of the safety and effectiveness of hydrotherapy was identified.	Understanding and removing barriers to the use of providing hydrotherapy, including personal staff concerns and lack of education and experience with hydrotherapy, may increase the use of hydrotherapy and concurrently delay or avoid medical pain management interventions. Nursing barriers to the use of hydrotherapy include personal concerns, knowledge and beliefs and lack of understanding of safety and effectiveness of hydrotherapy. These areas should be improved through education and ongoing mentoring.	Level III Good

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Stark, M. A., Rudell, B., & Haus, G. (2008). Observing position and movements in hydrotherapy: A pilot study. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 37*(1), 116-122. doi:10.1111/j.1552-6909.2007.00212.x	To observe and describe the positions and movements women choose while immersed in water during the first stage of labor.	Seven women who intended to use hydro-therapy in labor who were managed by midwives in a rural community hospital (location not stated).	Descriptive, observational study.	For 15 minutes of each hour during the first stage of labor, position and movements of participants were observed and recorded on a laptop computer. Women were free to choose when and how long to use hydrotherapy and had no restrictions on their movements. 435 movements were recorded.	Only 3 of the 7 women labored in the tub. Women who used the tub demonstrated a greater range of positions and movements in the tub than in bed, both throughout labor and during late first stage. Women had more contractions and made more rhythmic movements while in the tub than in the bed. Hydrotherapy may encourage upright positions and movements that facilitate labor progress and coping, helping women avoid unnecessary interventions.	Larger studies on position changes used with hydrotherapy during labor as well as outcomes for mother and baby are recommended. Future studies should include the use of epidurals, cesarean births and assisted deliveries to further understand and validate the use of hydrotherapy during labor. Providers, including nurses, need to be educated on the possible benefits of hydrotherapy and be encouraged to provide it as an option to their patients.	Level II Good, yet small sample size